Southern Parallel Forest Products
Permit to Construct Application

July 2018 Full Application

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Strategic Environmental Services

Permit to Construct Application

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Final Application to include:
April 2018 Submittal
May 2018 Update
and July 2018 Update

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1 EXECUTIVE SUMMARY

Southern Parallel Forest Products (SPFP) owns and operates a lumber sawmill in Albertville, Marshall County, Alabama. The Albertville mill currently operates under Title V Operating Permit No. 711-S001 issued on May 28, 2015.

SPFP is proposing to construct and operate a direct fired Continuous Drying Kiln using a green sawdust fueled burner. The Continuous Drying Kiln, proposed as Emission Unit (EU) No. 009, has a potential to dry 110 million board feet per year (MMBf/yr) using a 35 MMBtu/hr burner. Beyond construction of the new kiln, EU 009, no additional equipment requiring air permitting will be constructed or modified with this project.

As SPFP is permitted as a Prevention of Significant Deterioration (PSD) major source, potential emissions from the kiln construction project are compared to the PSD Significant Emission Rates (SER). The potential emissions from the construction project to install the Continuous Drying Kiln – EU 009 are shown in Table 1. Detailed emission calculations can be found in Appendix B and emission factor references can be found in Appendix F. The emission calculations are based on the design capacity of the unit and thus inherently include a "safety factor" to assure compliance with requested limits at all time. As shown within the Regulatory Applicability section, the proposed project results in a net emission increase that exceeds the PSD SER for volatile organic compounds (VOC) only.

As the Continuous Drying Kiln is the only unit being affected with this project, this application addresses only that unit. All other units' emissions, operation, and regulatory applicability remain the same as currently on file with ADEM as permitted within Permit No. 711-S001.

Table 1. Summary of Proposed EU 009 Project Potential to Emit

Description	Pollutant	Potential to Emit (tpy)
Criteria Pollutants	PM	7.70
	PM_{10}	7.70
	$PM_{2.5}$	7.70
	SO_2	3.83
	VOC (WPP1)	263.1
	CO	91.98
	Lead	7.36E-03
	NO_X	33.73
Hazardous Air Pollutants	Highest Single HAP	9.90
	Total HAP	16.74
Greenhouse Gases	CO_2e	32,125

2 PROCESS DESCRIPTION

Southern Parallel Forest Products produces dimensional lumber from southern yellow pine logs and is classified under Standard Industrial Classification (SIC) code 2421 and North American Industry Classification System (NAICS) Code 321113.

The mill consists of green end operation to include log receipt and preparation. The logs are debarked and furthered to the sawmill. Logs entering the Sawmill Operation (EU No. 004 & 005) are converted into various size green lumber by a variety of sawmill equipment. The sawmill includes two cyclones to recover sawdust and chips (C101 and 102).

After the sawmill, green lumber is sent to the lumber kilns for drying. The Albertville Mill has two steam heated batch kilns, Lumber Dry Kilns: North and South (EU No. 002). The steam for the batch kilns are provided by Three 28.576 MMBtu/hr Natural Gas-Fired Boilers (EU No. 007). A Continuous Drying Kiln (EU No. 009), direct fired using a 35 MMBtu/hr green sawdust burner, will also be used.

Dried rough lumber is sent from the kilns to be finished in the Planer Mill Operation (EU No. 003). The planer mill is equipped with a cyclone to recover shavings (C100).

Bark, sawdust, and shavings produced are conveyed to storage piles or bins. Ancillary equipment on site include Emergency Fire Water Pump Engine (EU No. 008) and various insignificant activities.

A process flow diagram is provided in Appendix A.

3 REGULATORY APPLICABILITY

Southern Parallel Forest Products (SPFP) is subject to certain federal and state air regulations. This section of the application summarizes the air permitting requirements and key air quality regulations that apply to the facility under both federal and state permitting programs. Applicability to New Source Review (NSR), Title V, New Source Performance Standards (NSPS), National Emissions Standards for Hazardous Air Pollutants (NESHAP), and ADEM state rules are addressed.

3.1 New Source Review Standards

NSR has two permitting programs: Nonattainment NSR (NNSR) and Prevention of Significant Deterioration (PSD). NNSR pertains to facilities in nonattainment areas, and PSD is the governing program for all other facilities. The Albertville Mill is in Marshall County, which is designated as an attainment area for all pollutants. The governing NSR regulation is, as such, the PSD permitting program. Lumber mills are not on the “list of 28” operations which are subject to a 100 tpy NSR major source threshold; therefore, the major source threshold for all criteria pollutants for PSD is 250 tpy.

SPFP facility-wide potential emissions of VOC are above 250 tpy. Thus, SPFP is classified as a PSD major source and the emissions increases from the proposed project must be evaluated and compared to the major modification thresholds for regulated pollutants for NSR permitting applicability under the PSD program.

3.1.1 Project Description

SPFP is proposing to construct and operate a new direct fired continuous drying kiln using a green sawdust fueled burner. The Continuous Drying Kiln, proposed as EU No. 009, has a potential to dry 110 million board feet per year (MMBf/yr) using a 35 MMBtu/hr burner.

The proposed project will not modify any existing sources at the mill. However, the project could increase production at the following unmodified but affected sources: Sawmill Operation, Waste Wood Chipper, Planer Mill Operation, and Roads.

3.1.2 Significant Emission Increase

ADEM Admin Code 335-3-14-.04(1)(d), states that a project is a major modification for a regulated NSR pollutant only if it causes both:

1. a significant emissions increase, as defined in ADEM Admin Code R 335-3-14-.04(mm); and
2. a significant net emissions increase, as defined in ADEM Admin Code R 335-3-14-.04(2)(c) and (2)(mm),

The first step in evaluating the PSD applicability for a proposed change is to evaluate if a significant emission increase will result. According to ADEM Admin Code R 335-3-14-.04(1)(e), the procedure for calculating whether a significant emission increase will occur depends on the type of emission unit being modified. These procedures are outlined in ADEM Admin Code R 335-3-14-.04(1)(f) through (i). As this project is a change to an existing facility involving a new emission unit and affecting existing emission units, the hybrid test of ADEM Admin Code R 335-3-14-.04(1)(i) is the relevant method for calculating the emission increases associated with the project. The hybrid test allows an actual-to-projected-actual applicability test for existing sources (Sawmill Operation, Waste Wood Chipper, Planer Mill Operation, and Roads), and actual-to-potential test for a new emission unit (Continuous Drying Kiln), then whether a significant emissions increase occurs is determined if the sum of the emission increases exceed the significant emission rate (SER).

3.1.3 Actual-to-Projected Actual Emissions Test

ADEM Admin Code R 335-3-14-.04(2)(nn)2(iii) provides the methodology on how the projected actual emissions (PAE) should be calculated within the Actual-to-Projected Actual Test:

> "[in determining the PAE, the owner or operator of the major stationary source] *shall exclude, in calculating any increase in emissions that results from the particular project, that portion of the unit's emissions following the project that an existing unit could have accommodated during the consecutive 24-month period used to establish the baseline actual emissions under subparagraph (2)(uu) of this Rule and that are not resulting from the particular project, including any increased utilization due to product demand growth."*

To calculate Projected Actual Emission (PAE), the facility is utilizing the stepwise approach methodology outlined in the U.S. EPA Region 3 letter regarding a PSD/NSR analysis completed by the Northampton Generating Company (Northampton Letter). The Northampton Letter outlines five steps necessary to determine if a significant emissions increase will occur from the proposed project.

Step 1 - Determine Baseline Actual Emissions (BAE)

The definition within ADEM Admin Code R 335-3-14-.04(2)(uu)2 is used to determine the BAE for all existing emission units included in the project. In determining the BAE, a facility can select any consecutive 24-month period over the ten years preceding the date a complete permit application is received by the department for the project. The 24-month period of April 2016 – March 2018 was selected for all NSR pollutants.

The summary of all unmodified but affected existing sources' BAE can be found in Table 3.1 below. The production data, emission factors, and the detailed calculated emissions to determine BAE can be found in Appendix C.

Table 3.1 Summary of BAE (tpy)

Baseline Actual Emissions (BAE)	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Planer Mill Cyclone (C100)	24.64	20.95	12.32	--	--	--	--	--
Sawmill Sawdust Cyclone (C101)	13.72	11.66	6.86	--	--	--	--	--
Waste Wood Chipper Cyclone (C102)	2.30	1.95	1.15	--	--	--	--	--
Haul Roads (Fugitive)*	15.70	4.47	0.45	--	--	--	--	--
Total BAE**	**40.66**	**34.56**	**20.33**	**0.00**	**0.00**	**0.00**	**0.00**	**0**
Total BAE*	**56.35**	**39.03**	**20.78**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

***includes non-quantifiable fugitive emissions**
****includes only quantifiable fugitive emissions**

Step 2 - Determine Projected Actual Emissions (PAE)

ADEM Admin Code R 335-3-14-.04(2)(nn) defines PAE as the maximum annual rate, in tons per year, at which an existing emissions unit is projected to emit a regulated NSR pollutant in any one of the ten years. SPFP projects the highest annual dry lumber production of 160,000 MBf/yr.

As part of the proposed project, SPFP will not physically modify the Planer Mill and Sawmill processes. However, better utilization of existing equipment and resources could result in higher average actual hourly production rates than those in the baseline period through the Planer Mill and Sawmill.

The summary of all unmodified but affected existing sources' PAE can be found in Table 3.2 below. Detailed PAE calculations can be found in Appendix C.

Table 3.2 Summary of PAE (tpy)

Projected Actual Emissions (PAE)	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Planer Mill Cyclone (C100)	30.05	25.54	15.03	--	--	--	--	--
Sawmill Sawdust Cyclone (C101)	17.77	15.11	8.89	--	--	--	--	--
Waste Wood Chipper Cyclone (C102)	2.97	2.53	1.49	--	--	--	--	--
Haul Roads (Fugitive)*	27.56	7.86	0.79	--	--	--	--	--
Total PAE**	**50.80**	**43.18**	**25.40**	**0.00**	**0.00**	**0.00**	**0.00**	**0**
Total PAE*	**78.36**	**51.03**	**26.18**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

***includes non-quantifiable fugitive emissions**

****includes only quantifiable fugitive emissions**

Step 3. Determine the excludable PAE emissions.

In determining whether a project will result in a significant emissions increase, the definition of projected actual emissions allows SPFP to exclude that portion of the projected actual emissions that the unit "could have accommodated" during the baseline period and that are unrelated to the project.

To do this, SPFP identified the highest monthly operating rate during each baseline. A one-month period was selected because it represents a long term sustainable operating rate that reflects normal operating capability. This maximum monthly operating rate is a conservative approximation of that portion of the production rates that the mill could have accommodated during the 24-month baseline period, and could be accommodated in the future, without the proposed project. Therefore, SPFP proposes to annualize the maximum production rates from the baseline period by multiplying the production by 12 months. The resulting production rate is equivalent to the annual production rate that could have been accommodated during the baseline period, see Table 3.3 below.

Table 3.3 Summary of CHA Production

Production	Maximum Baseline Month	Monthly Production	CHA Annualized Lumber Production
Sawmill	March 2018	10,450 MBf/mo	125,397 MBf/yr
		249 hr/mo	2,985 hr/yr
Planer Mill/Kilns	March 2018	10,031 MBf/mo	120,378 MBf/yr
Planer Mill	March 2018	394 hr/mo	4,722 hr/yr
Log Handling	March 2018	44,211 ton/mo	530,526 ton/yr
Green Sawdust	March 2018	3,630 ton/mo	43,558 ton/yr
Shavings	March 2018	2,402 ton/mo	28,825 ton/yr
Finished Lumber	March 2018	10,449 MBf/mo	125,391 MBf/yr

Detailed estimated could have accommodated (CHA) calculations can be found in Appendix C. Table 3.4 provides a summary of the total emissions that each source could have accommodated before the proposed project.

Table 3.4 Summary of CHA Emissions without Project (tpy)

Could Have Accommodated (CHA) - PSD Analysis Step 3c	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Planer Mill Cyclone (C100)	30.57	25.99	15.29	--	--	--	--	--
Sawmill Sawdust Cyclone (C101)	14.45	12.28	7.22	--	--	--	--	--
Waste Wood Chipper Cyclone (C102)	2.42	2.06	1.21	--	--	--	--	--
Haul Roads (Fugitive)*	20.07	5.72	0.57	--	--	--	--	--

***includes non-quantifiable fugitive emissions**

Excludable Emissions (EE) are calculated as the portion of PAE above BAE that the existing emission unit could have accommodated and that are not resulting from the particular project. Table 3.5 provides a summary of the EE.

Table 3.5 Summary of EE (tpy)

Excludable Emissions (EE) - PSD Analysis Step 3d	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Planer Mill Cyclone (C100)	5.41	4.60	2.70	--	--	--	--	--
Sawmill Sawdust Cyclone (C101)	0.73	0.62	0.36	--	--	--	--	--
Waste Wood Chipper Cyclone (C102)	0.12	0.10	0.06					
Haul Roads (Fugitive)*	4.37	1.25	0.12	--	--	--	--	--

***includes non-quantifiable fugitive emissions**

The adjusted Projected Actual Emissions (adjusted PAE) is calculated by subtracting the EE (Table 3.5) from the PAE (Table 3.2). Table 3.6 provides a summary of the adjusted PAE.

Table 3.6 Summary of Adjusted PAE (tpy)

Adjusted Projected Actual Emissions (APAE)	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Planer Mill Cyclone (C100)	24.64	20.95	12.32	--	--	--	--	--
Sawmill Sawdust Cyclone (C101)	17.04	14.49	8.52	--	--	--	--	--
Waste Wood Chipper Cyclone (C102)	2.85	2.42	1.43	--	--	--	--	--
Haul Roads (Fugitive)*	23.19	6.61	0.66	--	--	--	--	--
Total APAE**	**44.54**	**37.86**	**22.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0**
Total APAE*	**67.73**	**44.47**	**22.93**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

***includes non-quantifiable fugitive emissions**
****includes only quantifiable fugitive emissions**

Step 4 & 5. Subtract BAE from the emissions derived in Step 3, then compare the emissions increases to the PSD significant emissions rates (SER) for each pollutant.

The BAE calculated in Table 3.1 is subtracted from the adjusted PAE in Table 3.6 to determine the sum of the emission increases from the actual-to-projected actual test as shown in Table 3.7.

Table 3.7 Summary of Actual-to-Projected-Actual Test (tpy)

Actual-To-Adjusted Projected-Actual Test	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Total BAE*	40.66	34.56	20.33	0.00	0.00	0.00	0.00	0
Total APAE*	44.54	37.86	22.27	0.00	0.00	0.00	0.00	0
Total ATPA Existing Source Emission Increase	**3.88**	**3.30**	**1.94**	**0.00**	**0.00**	**0.00**	**0.00**	**0**

***includes only quantifiable fugitive emissions**

3.1.4 Actual-to-Potential Test for New Emission Unit

The actual-to-potential test as defined in ADEM Admin Code 335-3-14-.04(1)(g) is used to determine the project increase for the Continuous Drying Kiln as a new source. The detailed potential to emit emission calculations can be found within Appendix B. The baseline actual emissions (BAE) are equal to zero in accordance with ADEM Admin Code 335-3-14-.04(2)(uu)(3), since this is the initial construction and operation of the unit. The summary of the actual-to-potential is shown in Table 3.8 below.

Table 3.8 Actual-to-Potential Test for New Emission Units (tpy)

Actual-to-Potential test (ATP): New Sources	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Continuous Direct Fired Drying Kiln, BAE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Continuous Direct Fired Drying Kiln, PAE	7.70	7.70	7.70	263.07	3.83	91.98	33.73	32,125
Total ATP New Source Emission Increase	**7.70**	**7.70**	**7.70**	**263.07**	**3.83**	**91.98**	**33.73**	**32,125**

***includes only quantifiable fugitive emissions**

3.1.5 Hybrid test for Total Emissions Increase from Project

The sum of the emission from the Actual-to-Projected-Actual test in Table 3.7 and the Actual-to-Potential test in Table 3.8 are summed together to determine the total project emission increases. The increases are compared against the SER for each NSR pollutant. As shown in Table 3.9 below, the proposed project results in a significant emission increase for VOC only.

Table 3.9 Summary of Hybrid Total Emissions Increase Test (tpy)

Total Significant Emissions Increase Hybrid Test	PM	PM_{10}	$PM_{2.5}$	VOC	SO_2	CO	NOx	CO_2e
Total ATPA Existing Sources Emission Increase	3.88	3.30	1.94	0.00	0.00	0.00	0.00	0
Total ATP New Sources Emission Increase	7.70	7.70	7.70	263.07	3.83	91.98	33.73	32,125
Hybrid Test Total Emission Increase	**11.58**	**11.00**	**9.64**	**263.07**	**3.83**	**91.98**	**33.73**	**32,125**
PSD Significant Emission Rate (SER)	25	15	10	40	40	100	40	75,000
% of PSD SER Threshold	46.3%	73.3%	96.4%	657.7%	9.6%	92.0%	84.3%	42.8%

***includes only quantifiable fugitive emissions**

[redacted]

3.2 Title V Applicability

The federal Title V operating permit program is established at 40 CFR 70. The major source thresholds with respect to the Title V regulations are 100 tpy for each criteria pollutant, 10 tpy of any single HAP, and 25 tpy of any combination of HAP. As the potential emissions from the Albertville Mill exceed the 100 tpy major source threshold for VOC, a Title V permit is required for operation of the plant. The mill currently operates under Title V Operating Permit No. 711-S001.

3.3 New Source Performance Standards (NSPS)

NSPS, located in 40 CFR 60, require new, modified, or reconstructed sources to control emissions to the level achievable by the best demonstrated technology as specified in the applicable provisions. Moreover, any source subject to an NSPS is also subject to the general provisions of NSPS Subpart A, except as noted. The following section details the applicability of NSPS regulations to the proposed project. The NSPS applicability currently determined for existing equipment remains unchanged and is not addressed here.

3.3.1 40 CFR 60 Subpart A - General Provisions

All affected sources subject to source-specific NSPS are subject to the general provisions of NSPS Subpart A unless specifically excluded by the source-specific NSPS. Subpart A requires initial notification, performance testing, recordkeeping and monitoring, provides reference methods, and mandates general control device requirements for all other subparts as applicable.

3.3.2 40 CFR 60 Subpart Dc - Small Industrial-Commercial-Institutional Steam Generating Units

NSPS Subpart Dc, Small Industrial-Commercial-Institutional Steam Generating Units, applies to steam generating units rated between 10 and 100 MMBtu/hr constructed, modified, or reconstructed after June 9, 1989. NSPS Subpart Dc (Standards of Performance for Small Industrial Commercial-Institutional Steam Generating Units) applies to steam generating units with a heat input capacity greater than or equal to 10 MMBtu/hr and less than or equal to 100 MMBtu/hr that have been constructed, modified, or reconstructed after June 9, 1989. The term “steam generating unit” is defined under this regulation as shown below:

> *“Steam generating unit means a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart.”*

The Continuous Drying Kiln will operate with a green sawdust burner. However, the burner does not generate steam, because the combustion gases from the fuel will directly contact the lumber during the drying process. Therefore, Subpart Dc is not applicable to the kiln burner.

3.3.3 40 CFR 60 Subpart CCCC - Commercial and Industrial Solid Waste Incineration Units for Which Construction is Commenced after November 30, 1999 or for which Modification or Reconstruction is Commenced on or After June 1, 2001

NSPS Subpart CCCC establishes emission limits and standards for operation and maintenance of commercial and industrial solid waste incineration (CISWI) units. As the burner on the lumber kiln combusts wood residue for fuel, the potential applicability of this regulation was reviewed.

40 CFR 241.2 (part of the solid waste regulations) defines a clean cellulosic biomass as:

> *….those residuals that are akin to traditional cellulosic biomass such as forest-derived biomass (e.g., green wood, forest thinnings, clean and unadulterated bark, sawdust, trim, and tree harvesting residuals from logging and sawmill materials), corn stover and other biomass crops used specifically for energy production (e.g., energy cane, other fast growing grasses), bagasse and other crop residues (e.g., peanut shells), wood collected from forest fire clearance activities, trees and clean wood found in disaster debris, clean biomass from land clearing operations, and clean construction and demolition wood. These fuels are not secondary materials or solid wastes unless discarded. Clean biomass is biomass that does not contain contaminants at concentrations not normally associated with virgin biomass materials."*

The fuel for the burner is green sawdust produced at the Albertville Mill. By the definition provided above, the green sawdust is not classified as secondary materials or solid wastes in its proposed use at the mill. As such, the combustion unit is not a CISWI unit, and Subpart CCCC is not applicable for the burner.

3.4 National Emission Standards for Hazardous Air Pollutants (NESHAP)

NESHAP, located in 40 CFR 63, have been promulgated for source categories that emit hazardous air pollutants (HAP) to the atmosphere. A facility that is a major source of HAP is defined as having potential emissions greater than 25 tpy of total HAP and/or 10 tpy of a single HAP. Facilities with a potential to emit HAP at an amount less than the major source thresholds are otherwise considered an area source. The NESHAP allowable emission limits are most often established on the basis of a maximum achievable control technology (MACT) determination for the particular source. The NESHAP apply to sources in specifically regulated industrial source categories (Clean Air Act Section 112(d)) or on a case-by-case basis (Section 112(g)) for facilities not regulated as a specific industrial source type.

The Albertville Mill is currently classified as a major source of HAP. The following section details the applicability of NESHAP regulations to the proposed project. The NESHAP applicability currently determined for existing equipment remains unchanged and is not addressed here.

3.4.1 40 CFR 63 Subpart A - General Provisions

NESHAP Subpart A, General Provisions, contains national emission standards for HAP defined in Section 112(b) of the Clean Air Act. All affected sources, which are subject to another NESHAP, are subject to the general provisions of NESHAP Subpart A, unless specifically excluded by the source-specific NESHAP.

3.4.2 40 CFR 63 Subpart DDDD - Plywood and Composite Wood Products

40 CFR 63 Subpart DDDD regulates HAP emissions from plywood and composite wood products (PCWP) manufacturing facilities that are major HAP sources. Lumber kilns are process units within the existing "affected source" under the PCWP MACT, defined in 40 CFR 63.2232(b) as

> *The collection of dryers, refiners, blenders, formers, presses, board coolers, and other process units associated with the manufacturing of plywood and composite wood products. The affected source includes, but is not limited to, green end operations, refining, drying operations (including any combustion unit exhaust stream routinely used to direct fire process unit(s)), resin preparation, blending and forming operations, pressing and board cooling operations, and miscellaneous finishing operations (such as sanding, sawing, patching, edge sealing, and other finishing operations not subject to other national emission standards for hazardous air pollutants (NESHAP)). The affected source also includes onsite storage and preparation of raw materials used in the manufacture of plywood and/or composite wood products, such as resins; onsite wastewater treatment operations specifically associated with plywood and composite wood products manufacturing; and miscellaneous coating operations (§63.2292). The affected source includes lumber kilns at PCWP manufacturing facilities and at any other kind of facility.*

Per §63.2252, for process units not subject to the compliance options or work practice requirements specified in §63.2240 (including, but not limited to, lumber kilns), the Albertville Mill is not required to comply with the compliance options, work practice requirements, performance testing, monitoring, startup, shutdown, and malfunction (SSM) plans, and recordkeeping or reporting requirements of Subpart DDDD, or any other requirements in NESHAP Subpart A, General Provisions, except for the initial notification requirements in §63.9(b). The Continuous Drying Kiln will be an affected source subject to the requirements contained in Subpart DDDD. As allowed under 40 CFR 63.9(b)(1)(iii), it is requested this application serves as the initial notification for the new kiln and thus complying with the applicable initial notification requirements pursuant to 40 CFR Part 63.2280(b).

3.4.3 40 CFR 63 Subpart DDDDD - Industrial, Commercial, and Institutional Boilers and Process Heaters

40 CFR 63 Subpart DDDDD, also known as Boiler MACT, was originally promulgated on September 13, 2004, and regulated HAP emissions from solid, liquid, and gaseous fuel-fired boilers and process heaters at facilities that are a major source of HAP.

Under the most recent version of the Boiler MACT, a process heater is defined in 40 CFR 63.7575, as

> *…an enclosed device using controlled flame, and the unit's primary purpose is to transfer heat indirectly to a process material (liquid, gas, or solid) or to a heat transfer material (e.g., glycol or a mixture of glycol and water) for use in a process unit, instead of generating steam. Process heaters are devices in which the combustion gases do not come into direct contact with process materials. A device combusting solid waste, as defined in §241.3 of this chapter, is not a process heater unless the device is exempt from the definition of a solid waste incineration unit as provided in section 129(g)(1) of the Clean Air Act. Process heaters do not include units used for comfort heat or space heat, food preparation for on-*

site consumption, or autoclaves. Waste heat process heaters are excluded from this definition.

The Continuous Drying Kiln is direct-fired as the combustion gases from the fuel will directly contact the lumber during the drying process. Therefore, the kiln is not considered a process heater, and Boiler MACT is not applicable as it is currently written to the kiln.

3.5 Compliance Assurance Monitoring (CAM) Regulations

Under 40 CFR 64, the Compliance Assurance Monitoring (CAM) Regulations, facilities are required to prepare and submit monitoring plans for certain emission units with a Title V application. The CAM Plans provide an on-going and reasonable assurance of compliance with emission limits. Under the general applicability criteria, this regulation only applies to emission units that use a control device to achieve compliance with an emission limit and whose pre-controlled emission levels exceed the major source thresholds under the Title V permitting program.

The project does not include an emission unit using a control device. CAM requirements are not addressed.

3.6 Alabama State Rule Applicability

In addition to federal air regulations, the ADEM Admin. Code 335-3, establish regulations applicable at the emission unit level (source specific) and at the facility level. ADEM rules potentially applicable the proposed project at the Albertville Mill are detailed in the following sections.

3.6.1 Visible Emissions

ADEM Admin. Code 335-3-4-.01 restricts visible emissions from any source of particulate emissions to 20 percent with not more than one 6-minute period of up to 40 percent opacity per 60-minute period. This regulation also details monitoring requirements and work practice standards. The Continuous Drying Kiln is subject to this rule.

3.6.2 Fugitive Dust and Fugitive Emissions

ADEM Admin. Code 335-3-4-.02 requires usage of reasonable precautions to minimize fugitive dust and fugitive emissions from sources such as roadways and storage piles. SPFP will continue take the appropriate precautions to prevent fugitive dust from becoming airborne including application of water or binders, reduced speed, or paving.

3.6.3 Fuel Burning Equipment

ADEM Admin. Code 335-3-4-.03(1) regulates PM emissions from fuel burning equipment. Per 335-3-1-.02(ee), fuel-burning equipment is defined as:

…any equipment, device, or contrivance and all appurtenances thereto, including ducts, breechings, fuel-feeding equipment, ash removal equipment, combustion controls, stacks, and chimney, used primarily, but not exclusively, to burn any fuel for the purpose of indirect heating in which the material being heated is not contacted by and adds no substance to the products of combustion.

Although the Continuous Drying Kiln is a fuel-burning unit, it does not serve as indirect heating equipment. Therefore, it is not subject to ADEM Admin. Code 335-3-4-.03.

ADEM Admin. Code 335-3-5-.01(1) regulates SO_2 emissions from fuel burning installations in Category I and Category II Counties. The Albertville Mill is in a Category II County. Therefore, SO_2 emissions from the kiln burner are limited to 4.0 lb/MMBtu. Estimates of SO_2 from the Continuous Drying Kiln's fuel burning equipment are based on U.S. EPA's AP-42 emission factors and are less than that allowed by ADEM's code as shown in Table 3.9 below.

Table 3.9 SO_2 PWR vs. PTE

Operation	Emission Unit No.	Heat Input (H) (MMBtu/hr)	SO_2 PWR	SO_2 PWR	SO_2 PTE	Above Limit?
			(lb/MMBtu)	(lb/hr)	(lb/hr)	
Continuous Drying Kiln	009	35.0	4.00	140.00	1.05	No

3.6.4 PM from Process Industries

ADEM Admin. Code 335-3-4-.04(1) addresses PM emissions from manufacturing processes commonly called the process weight rate (PWR). This regulation applies to the Continuous Drying Kiln. The process weight rate for the kiln is based on lumber processing rate of 29.2 ton/hr. The maximum allowable PM emissions for new sources with production weight rates less than 30 tons/hr is determined using the following equation:

$$E = 3.59\ P^{0.62} \qquad P < 30 \text{ tons/hr}$$

where:

E = allowable particulate emissions, lb/hr
P = process weight rate, tons/hr

As shown in Table 3.10, the new Continuous Drying Kiln complies with the process weight rate PM emission limitations contained in ADEM Admin. Code 335-3-4-.04.

Table 3.10 PM PWR vs. PTE

Operation	Emission Unit No.	Production (P)[1]	PM PWR	PM PTE	Above Limit?
			(lb/hr)	(lb/hr)	
Continuous Drying Kiln	009	29.2	29.09	2.25	No

[1] The maximum hourly production in tons was derived from the maximum hourly throughput of 13.4 MBf/hr and the density factor for rough green lumber of 2.18 ton/MBf.

4 BEST AVAILABLE CONTROL TECHNOLOGY ANALYSIS

Under Prevention of Significant Deterioration (PSD) rules contained ADEM Admin Code 335-3-14-.04, the Albertville Mill must apply Best Available Control Technology (BACT) on each new or modified emissions unit for each pollutant that would emit in a significant new emissions increase. BACT is defined in ADEM Admin Code 335-3-14-.04(2)(l) as follows:

> "Best Available Control Technology (BACT)" shall mean an emissions limitation (including a visible emission standard) based on the maximum degree of reduction for each regulated NSR pollutant which would be emitted from any proposed major stationary source or major modification which the Director, on a case-by-case basis, taking into account energy, environmental, and economic impacts and other costs, determines is achievable for such source or modification through application of production processes or available methods, systems and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of such pollutant. In no event shall application of BACT result in emissions of any pollutant which would exceed the emissions allowed by any applicable standard under 40 CFR Parts 60 or 61. If the Director determines that technological or economic limitations on the application of measurement methodology to a particular emissions unit would make the imposition of an emissions standard infeasible, a design, equipment, work practice, operational standard, or combination thereof may be prescribed instead to satisfy the requirement for the application of BACT. Such standard shall, to the degree possible, set forth the emissions reduction achievable by implementation of such design, equipment, work practice, or operation and shall provide for compliance by means which achieve equivalent results.

A BACT analysis has been provided for each new or modified emissions emission unit for each pollutant exceeding an applicable PSD Significant Emission Rate, which is volatile organic compounds (VOC) for the proposed project addressed here.

4.1.1 BACT Methodology

In a memorandum dated December 1, 1987, the Environmental Protection Agency (EPA) stated its preference for a “top-down” approach to BACT analysis. After determining if any New Source Performance Standard (NSPS) is applicable, the first step in this approach is to determine, for the emission unit in question, the most stringent control available for a similar or identical source or source category. If it can be shown that this level of control is technically infeasible or have unacceptable energy, economic, and environmental impact for the unit in question, then the next most stringent level of control is determined and similarly evaluated. This process continues until the BACT level under consideration cannot be eliminated by any substantial or unique technical, environmental, or economic objection. Presented below are the five basic steps of a top-down BACT review as identified by the EPA.

Step 1 – Identify All Control Technologies

Available control technologies are identified for each emission unit in question. The following methods are used to identify a comprehensive list of potential technologies:

1. Researching the Reasonable Available Control Technology (RACT)/BACT/Lowest, Achievable Emission Rate (LAER) Clearinghouse (RBLC) database,
2. Surveying regulatory agencies,
3. Drawing from previous engineering experience,

4. Surveying air pollution control equipment vendors, and
5. Surveying available literature.

Step 2 – Eliminate Technically Infeasible Options

After the identification of control options, an analysis is conducted to eliminate technically infeasible options. A control option is eliminated from consideration if there are process-specific conditions that prohibit the implementation of the control technology or if the highest control efficiency of the option would result in an emission level that is higher than any applicable regulatory limits, such as NSPS.

Step 3 – Rank Remaining Control Technologies by Control Effectiveness

Once technically infeasible options are removed from consideration, the remaining options are ranked based on their control effectiveness (percent pollutant removed). If there is only one remaining option or if all of the remaining technologies could achieve equivalent control efficiencies, ranking based on control efficiency is not required.

Step 4 – Evaluate Most Effective Controls and Document Results

Beginning with the most efficient control option in the ranking, detailed economic, energy, and environmental impact evaluations are performed. If a control option is determined to be economically feasible without adverse energy or environmental impacts, it is not necessary to evaluate the remaining options with lower control efficiencies.

The economic evaluation centers on the cost effectiveness of the control option. Cost of installing and operating control technologies are estimated and annualized following the methodologies outlined in EPA's OAQPS Control Cost Manual (CCM) and other industry resources.

Step 5 – Select BACT

In the final step, one pollutant-specific control option is proposed as BACT for each emission unit under review based on evaluations from the previous step.

The EPA has consistently interpreted the statutory and regulatory BACT definitions as containing two core requirements that the agency believes must be met by any BACT determinations. First, the BACT analysis must include consideration of the most stringent available control technologies, i.e. those which provide the "maximum degree of emission reduction." Second, any decision to require a lesser degree of emission reduction must be justified by an objective analysis of "energy, environmental, and economic impacts."

The potential increase in VOC emissions resulting from the proposed Continuous Drying Kiln at the Albertville Mill will exceed the PSD significant emission rate. Therefore, VOC emissions from the Continuous Drying Kiln is subject to a BACT analysis.

4.1.2 BACT Determination for the Continuous Drying Kiln (EU 009)

During the lumber drying process, organic compounds present in the wood will be released. These are organic compounds that are in gaseous form at the elevated temperature of the wood, and are comprised largely of lower molecular weight volatiles, and higher molecular weight resin and fatty acids. The type and amounts of compounds released will depend on several factors related to the drying process, including the kiln temperature, the surface area of the wood material relative to its mass, initial moisture content, and the amount of moisture removed from the material as well as the wood species dried.

Step 1: The first of the five steps in the top-down BACT analysis procedure is to identify control technologies for each pollutant. The EPA RACT/BACT/LAER Clearinghouse (RBLC) was searched for lumber drying kilns (process type 30.8) permitted after January 1, 2008. The search was further refined to address only VOC for this analysis. The search of lumber drying kilns was then narrowed to match the equipment similar to SPFP's proposed kiln (i.e. direct fired kiln, wood fuel). The results of this search are included as RBLC results in Appendix E. The range of VOC limits based on throughput was between 3.5 lb/MBf and 4.5 lb/MBf. In cases where BACT was specified, it was determined to be proper maintenance & operations such as "work practice standards", "proper maintenance and operation", and "proper temperature and process management; drying to appropriate moisture content" with no additional/add-on control.

As the review of the RBLC did not reveal any facilities that have add on control for lumber drying kilns, a search was also completed of VOC control technologies for other processes that could possibly be applied to a lumber drying kiln. Control technologies evaluated are:

- Regenerative Thermal Oxidation
- Regenerative Catalytic Oxidation
- Carbon Adsorption
- Condensation
- Biofiltration
- Wet Scrubbing
- Proper Maintenance & Operation

<u>Regenerative Thermal Oxidation</u>: Regenerative Thermal Oxidizer (RTO) units use beds of ceramic pieces to recover and store heat. A VOC laden air stream passes through a heated ceramic bed before entering a combustion chamber. In the combustion chamber, the VOC-laden gas stream is heated by auxiliary fuel (natural gas) combustion to a final oxidation temperature typically between 1,400°F to 1,500°F and maintained at this temperature to achieve maximum VOC destruction. The exhaust gases from the combustion chamber are used to heat another ceramic bed. Periodically, the flow is reversed so the bed that was being heated is now used to preheat the VOC-laden gas stream. Usually, there are three or more beds that are continually cycled. Destruction efficiency of VOC depends upon the design criteria (i.e., chamber temperature, residence time, inlet VOC concentration, compound type, and degree of mixing). Typical VOC destructive efficiency ranges from 95 to 99% for RTO systems depending on system requirements and characteristics of the contaminated stream. Lower control efficiencies are generally associated with lower concentration flows.

<u>Regenerative Catalytic Oxidation</u>: Regenerative catalytic oxidizer (RCO) units function similar to an RTO, except that the heat recovery beds in RCO contain catalytic media. The catalyst accelerates the rate of VOC oxidation and allows for VOC destruction at lower temperatures than in an RTO, typically 600°F to 1,000°F, which reduces auxiliary fuel usage. Typical VOC destructive efficiency ranges from 90 to 99% for RCO systems. However, this also depends on system requirements and characteristics of the contaminated stream.

<u>Carbon Adsorption</u>: The core component of a carbon adsorption system is an activated carbon bed contained in a steel vessel. The VOC-laden gases pass through the carbon bed and the VOCs are adsorbed on the activated carbon. The cleaned gas is discharged to the atmosphere. The spent carbon is regenerated either at an onsite regeneration facility or by an off-site activated carbon supplier. Steam is used to replace adsorbed organic compounds at high temperatures to regenerate

the spent carbon. At proper operating conditions, carbon adsorption systems have demonstrated VOC reduction efficiencies of approximately 90 to 95%.

Condensation: Condensation removes vaporous contaminants from the gas stream by cooling it and converting the vapor into a liquid. In some instances, control of VOC can be satisfactorily achieved entirely by condensation. However, most applications require additional control methods. In such cases, the use of a condensation process reduces the concentration load on downstream control equipment. The two most common type of condensation devices are contact or barometric condensers and surface condensers.

Biofiltration: Biofiltration is an air pollution control technology in which off-gases containing biodegradable organic compounds are vented, under controlled temperature and humidity, through a special filter material containing microorganisms. As exhaust gases pass through the biofilter, VOC is absorbed on the filter material, and the microorganisms break down the compounds and transform them into CO_2 and H_2O with varying efficiency.

Wet Scrubbing: Scrubbing of gas or vapor pollutants from a gas stream is usually accomplished in a packed column (or other type of column) where pollutants are absorbed by counter-current flow of a scrubbing liquid. A VOC laden gas stream with relatively high-water solubility is required in order for the wet scrubber to be effective.

Proper Maintenance and Operation: Proper maintenance and operation of lumber drying kilns can effectively reduce VOC emissions. Proper drying schedule and temperature should be selected based on moisture content and manufacturer's specifications. Routine maintenance should also be completed on kilns based on manufacturer's recommendations.

Step 2: The second of the five steps in the top-down BACT analysis procedure is to eliminate technically infeasible control technologies. The table below provides a summary of the feasibility of the control technologies identified in Step 1.

Pollutant	Control Technology	Feasibility
VOC	Regenerative Thermal Oxidation	Infeasible
	Regenerative Catalytic Oxidation	Infeasible
	Carbon Adsorption	Infeasible
	Condensation	Infeasible
	Biofiltration	Infeasible
	Wet Scrubbing	Infeasible
	Proper Maintenance and Operation	Feasible

While the emissions are fugitive in nature and collection is infeasible; the following sections provide brief explanations on the further infeasibility of the VOC control technologies for the proposed kilns.

Regenerative Thermal Oxidation: Due to the high moisture content and low exit temperature in the exhaust stream, RTO would be technically infeasible.

Regenerative Catalytic Oxidation: Although regenerative catalytic oxidizers can operate at a lower temperature than thermal oxidizers, the temperature of the exit stream from lumber drying kilns is still not high enough for optimal function of the catalytic oxidizer. Furthermore, loss of catalytic activity occurs due to fouling by particulate matter or suppression or poisoning from other contaminants in the waste gas stream. In order to effectively use catalytic oxidation, the contaminants must be removed from the waste gas stream. Removing these contaminants would require additional control equipment which adds greatly to the cost of the system. Catalysts must periodically be replaced due to thermal aging, adding significantly to the cost of operating the unit in addition to creating solid waste. Catalytic oxidation has never been applied to a lumber drying kiln. Regenerative catalytic oxidation is not considered feasible for the proposed lumber drying kilns.

Carbon Adsorption: Carbon adsorption is not practical because of the high moisture content of the exhaust stream from the lumber drying kilns. At high moisture content, water molecules begin to compete with the hydrocarbon molecules for active adsorption sites. This reduces the capacity and the efficiency of the adsorption system. For the reason stated above and because there are currently no known lumber drying kilns that are equipped with carbon adsorption system, the use of carbon adsorption systems for the proposed lumber drying kilns is not considered technically feasible.

Condensation: Condensation is only effective when the gas stream can be cooled to a temperature where VOC constituents condense as a liquid out of the gas stream. To condense terpenes, the primary constituent of lumber kiln VOC emissions, the temperature would need to be reduced to -40°F. At this temperature, freezing of the water vapor would generate ice, causing unacceptable plugging of the unit. Condensation is not technically feasible for the proposed lumber drying kilns.

Biofiltration: The most important variable affecting bioreactor operations is temperature. Most microorganisms can survive and flourish in a temperature range of 60 to 105°F (30 to 41°C). The exiting exhaust temperature of the proposed lumber kilns is approximately 140 - 200°F. Furthermore, the VOC emissions from the kilns are primarily terpenes. Terpenes are highly viscous and would foul the biofilter. The application of biofiltration technology for VOC removal from lumber kiln emissions has not been demonstrated. Due to the temperature requirement, large footprint requirement for a biofiltration system, and the unproven application of biofiltration to this type of process, biofiltration is not technically feasible for the proposed lumber drying kilns.

Wet Scrubbing: The VOC emissions from the kilns are primarily terpenes. Terpenes are not highly soluble. Moreover, they are highly viscous and would foul the absorption media of a wet scrubber. Wet scrubbing is not technically feasible for the proposed lumber drying kilns.

Step 3: The only control technology considered technically feasible and identified in the RBLC is proper maintenance and operation; ranking is not necessary.

Step 4: Proper maintenance and operation is the only remaining technology/method for this application. A search of EPA RACT/BACT/LAER Clearinghouse indicated that no facilities are utilizing add-on controls for continuous dry kilns. No control technology is currently feasible for lumber drying kilns beyond proper maintenance and operation. The RBLC search shows other emission factors utilized in permitting emission limits of VOC; there is no information to determine that these factors can be routinely “achieved in practice”. The species of wood dried within a kiln has a distinct impact on the resulting VOC emissions.

Step 5: The fifth and final step in the top-down BACT analysis procedure is the selection of the BACT level of control for each pollutant. Per EPA guidance, BACT is the most effective control technology not eliminated by the previous four steps of the analysis. Proper maintenance and operation with a VOC emission rate of 3.8 lb/MBf is the only remaining technology for the reduction of VOC emissions from lumber drying kilns and SPFP proposed it as BACT. The proposed BACT limit for VOC is interpreted as VOC as C. Additionally, since the VOC (WPP1) is a commonly expressed VOC measurement for sawmills, SPFP also presents the VOC (WPP1) emission rate calculated to be 4.74 lb/MBf as an alternative BACT limit.

WPP1 VOC is an acronym for Wood Products Protocol 1 VOC from the EPA document, “Interim VOC Measurement Protocol for the Wood Products Industry – July 2007.” WPP1 VOC is calculated using the following equation: [VOC as C x 1.225 + (1-0.65) x Methanol + Formaldehyde].

5 OZONE AND ADDITIONAL IMPACTS ANALYSIS REVIEW

5.1 Ozone Impact Analysis Review (Modeling Protocol)

Both VOC and NOx are recognized as precursors to ozone, which has an established National Ambient Air Quality Standard (NAAQS). Since the project has a significant emissions increase of VOC, an evaluation in terms of VOC effect on attainment status of ozone is required. Pursuant to ADEM Admin Code 335-3-14-.04(12)(a)(1), air quality monitoring must be conducted for each pollutant potentially emitted at a significant emission rate by the proposed source or modification. Therefore, a pre-construction ambient monitoring analysis would be required for ozone emissions, and monitoring data would be required to be submitted as part of the application. As demonstrated below the pre-construction monitoring is fulfilled with the existing monitoring stations operated by the ADEM, as they are representative of the conditions at the proposed Continuous Drying Kiln.

The Sand Mountain ozone monitoring site in Crossville in DeKalb County is only 21 km from the Albertville Mill. Given the proximity and the regional nature of background ozone, the Sand Mountain provides a representative indication of ozone concentrations in the vicinity of the Albertville Mill. The most recent three years of ozone monitoring data for the Sand Mountain station was derived from Table 7 of the *State of Alabama Ambient Air Monitoring 2017 Consolidated Network Review* for this ozone impact analysis.

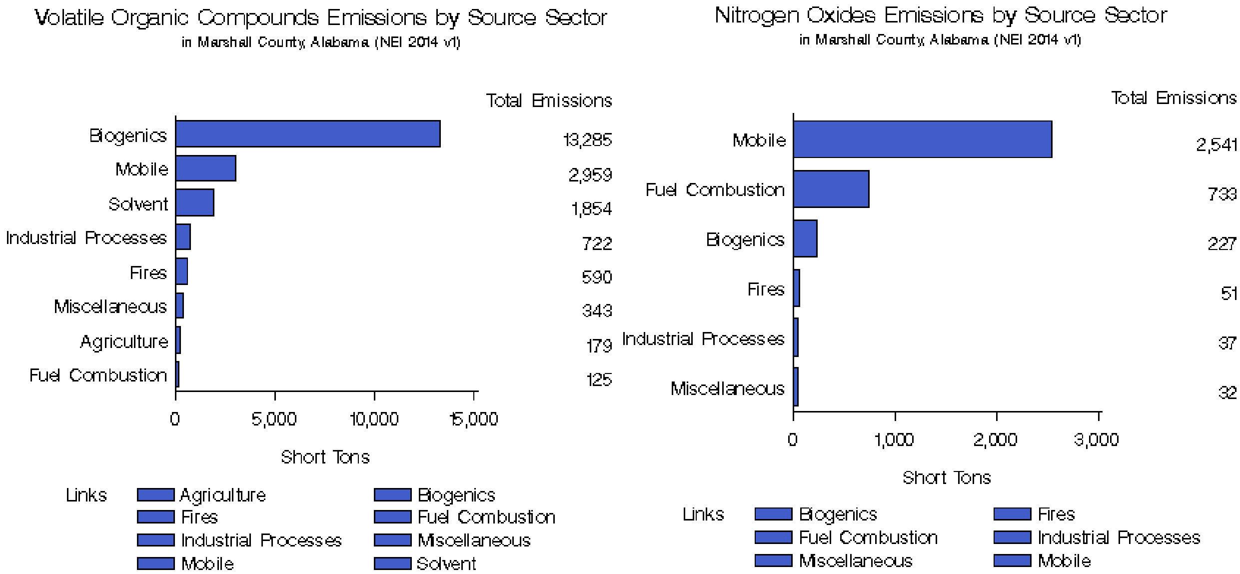
The 3-year average in the table below represents the 4^{th} high daily maximum 8-hour concentration averaged over 3 years (2014-2016) for DeKalb County.

Table 5.1 Ambient Air Monitoring of Background Ozone Concentration (ppm)

Ozone Monitoring Site Location	County	Site Name	Station AQS ID	Distance (km)	3-Year (2014-2016) Average (ppm)
Crossville, AL	DeKalb	Sand Mountain	01-049-9991	21	0.063

The increase in ozone formation from the proposed project is expected to be insignificant. The total potential emission increases associated with Continuous Drying Kiln is 263.07 tpy VOC as C and 33.73 tpy NOx. This represents a total emitted VOC increase of 1.3% over a 2014 baseline (20,057 tpy) and a NOx increase of 0.93% over a 2014 baseline (3,621 tpy) from Marshall County as obtained from the 2014 EPA National Emission Inventory (NEI) Air Data County Emissions Map (http://www.epa.gov/air/emissions/). The ozone baseline data for Marshall County is shown in Figure 1 below.

FIGURE 1. EPA AirData County Emissions for Marshall County, Alabama



Only accounting for the baseline emissions from Marshall County, the ratio of VOC to NOx is 5.5:1. This approach is a conservative estimation of the VOC to NOx ratio as it does not account for the less industrially developed surrounding counties and other regional impacts. The proposed project will have a negligible impact on this ratio.

Based on the Marshall County surrounding area's low concentration of ozone, and attainment status along with the Continuous Drying Kiln projected VOC emissions presenting a minor increase in total VOC emissions, there is no expected effect on the attainment status of the region.

5.1.1 Modeled Emission Rates for Precursors (MERPs)

EPA has recently developed the Modeled Emission Rates for Precursors (MERPs) as a Tier 1 screening method for determining if a project's precursor emission increases (i.e. VOC, NOx, SO_2) are expected to insignificant for secondary ozone or $PM_{2.5}$ formation. EPA developed several MERPs values based on modeling for a variety of sources and locations throughout the country. A project's emissions increases should be expressed as a percent of the MERPs for each precursor that requires PSD permitting and then summed. If combined precursor values are less than 100%, this indicates that the critical air quality threshold (e.g. Significant Impact Limit) will not be exceeded.

For this project, SPFP has evaluated secondary formation of ozone from VOC increase, as the pollutant requiring PSD permitting, and at ADEM's request, also from NOx increase. SPFP conservatively selected the lowest VOC (948 tpy) and NOx (126 tpy) 8-hr daily maximum ozone MERPs value for the Central U.S. (Errata Memo February 23, 2017, Table 7.1). The calculation below shows that the project emissions are only 55% and such that air quality impacts of ozone from this project would be expected to be less than the critical air quality threshold.

$$\frac{263.07\ tpy}{948\ tpy\ (VOC\ 8-hr\ daily\ maximum\ ozone\ MERP)}+\frac{33.73\ tpy}{126\ tpy\ (NOx\ 8-hr\ daily\ maximum\ ozone\ MERP)}$$

$$=0.28+0.27=0.55*100\%=55\%$$

5.2 Additional Impacts Analysis Review

The potential impact of the proposed sawmill's air pollutant emissions associated with construction and related growth are presented in this section as well as assessment of the impact on soil, vegetation, and visibility. A qualitative approach has been taken for these analyses as areas which do not have well established analytical techniques.

5.2.1 Construction and Growth Impacts

The proposed project has no effect on construction and growth impacts. During construction, SPFP will minimize the impact on the surrounding environment primarily focusing on reduction of the formation of fugitive particles.

The construction and operation of the Continuous Drying Kiln should not result in any noticeable residential growth or commercial growth in the area.

5.2.2 Impact on Soil and Vegetation

The NAAQS are intended to protect the public welfare from adverse effects of airborne pollutants. This protection extends to soil and vegetation. Predicted concentrations of VOC resulting from the Continuous Drying Kiln will not cause or contribute to violation of the NAAQS. Because the NAAQS were established to protect human welfare, no significant impacts on the soil are expected due to the proposed project. The Continuous Drying Kiln will utilize best available control technology to reduce potential emissions of VOC.

The effects of air pollution on vegetation can be classified into three distinct categories: acute, chronic, and long-term. Acute effects are those resulting from a short exposure (< 1 month) to high concentrations. Chronic effects refer to those developed from exposure to a threshold level of pollutant over months or years. Long-term effects refer to abnormal changes in ecosystems and subtle physiological alterations in organisms. Both acute and chronic effects are the result of an air borne pollutant acting directly on an organism while long-term effects can be indirectly caused by secondary effects such as changes in soil pH.

In addition to BACT, SPFP will utilize good working practices for equipment associated with the proposed Continuous Drying Kiln. The combination of BACT, good work practices, and minimal air quality impacts will result in minimal impact on the soil and vegetation in and around the site.

5.2.3 Impact on Class II Area Visibility

The PSD regulations require an evaluation of the impact of project emissions on visibility in Class II areas. The analysis is required only for those pollutants for which PSD review is triggered. The relevant pollutants for visibility are PM, NOx, and SO_2. The project triggers PSD review for VOC only and does not have a significant net emissions increase of PM, NOx, and SO_2. Therefore, a visibility analysis is not necessary because no significant impacts are expected.

5.2.4 Impact on Class I Area Visibility (Regional Haze Analysis)

One component of the PSD regulations includes the protection of air quality and air quality related values (AQRV) at potentially affected nearby Class I areas. Impacts from a proposed project are typically required if they are within 300 km of one or more Class I areas. There are four Class I areas located within 300 km of the SPFP.

Sipsey Wilderness Area	105 km
Cohotta Wilderness Area	160 km
Joyce Kilmer-Slickrock Wilderness	240 km
Great Smoky Mountains National Park	250 km

Based on the Federal Land Managers Air Quality Related Values Work Group (FLAG) 2010 Report, Class I evaluations for visibility are not required for a facility if the Q/D ratio for the project is less than or equal to 10 (as long as the Class I area is beyond 50 km from the site). The Q in the Q/D equation is equal to 45.26 tpy and is based on the increase in all visibility affecting pollutants (NOx, SO_2, PM, and H_2SO_4) calculated on the basis of maximum 24-hr emissions in tons/yr resulting from the project. The D in the equation is based on the distance (km) from the site to the Class I area. Table 5.2 below shows that Q/D ratio for all five Class I areas is below the screening value of 10.

Table 5.2 Class 1 Area Q/D Ratio Screening Test

Class I Area	Distance from Facility (km)	Q/D
Sipsey Wilderness Area	105	0.4
Cohotta Wilderness Area	160	0.3
Joyce Kilmer-Slickrock Wilderness	240	0.2
Great Smoky Mountains National Park	250	0.2

5.2.5 Analysis of Endangered Species

An air quality impact analysis has been performed for ozone (for which VOC is a precursor). The Continuous Drying Kiln project will result in potential impacts below the NAAQS. It is possible that some endangered species may be present in Marshall County; however, through compliance with the NAAQS, SPFP does not expect the sawmill to have an impact on any endangered species. According to the U.S. Fish and Wildlife Service, the currently listed endangered species located in Marshall County include the Black warrior Waterdog (Amphibian), Alabama lampmussel (Clam), Pale Lilliput (Clam), Pink mucket (Clam), Finerayed pigtoe (Clam), Rough pigtoe (Clam), Shiny pigtoe (Clam), Spectaclecase (Clam), Slabside Pearlymussel (Clam), Upland combshell (Clam), Ovate clubshell (Clam), Triangular Kidneyshell (Clam), Snuffbox mussel (Clam), Sheepnose Mussel (Clam), Alabama cave shrimp (Crustacean), Cahaba shiner (Fish), Palezone shiner (Fish), Rush Darter (Fish), Green pitcher-plant (Flowering Plant), Harperella (Flowering Plant), Morefield's leather flower (Flowering Plant), Indiana bat (Mammal), and the Gray bat (Mammal).

In addition to BACT, SPFP will utilize good working practices for equipment associated with the proposed Continuous Drying Kiln. The combination of BACT, good work practices, and minimal air quality impacts will result in the sawmill having minimal impact on endangered species near the site.

6 PROPOSED COMPLIANCE

6.1 Proposed Monitoring, Recordkeeping, and Reporting

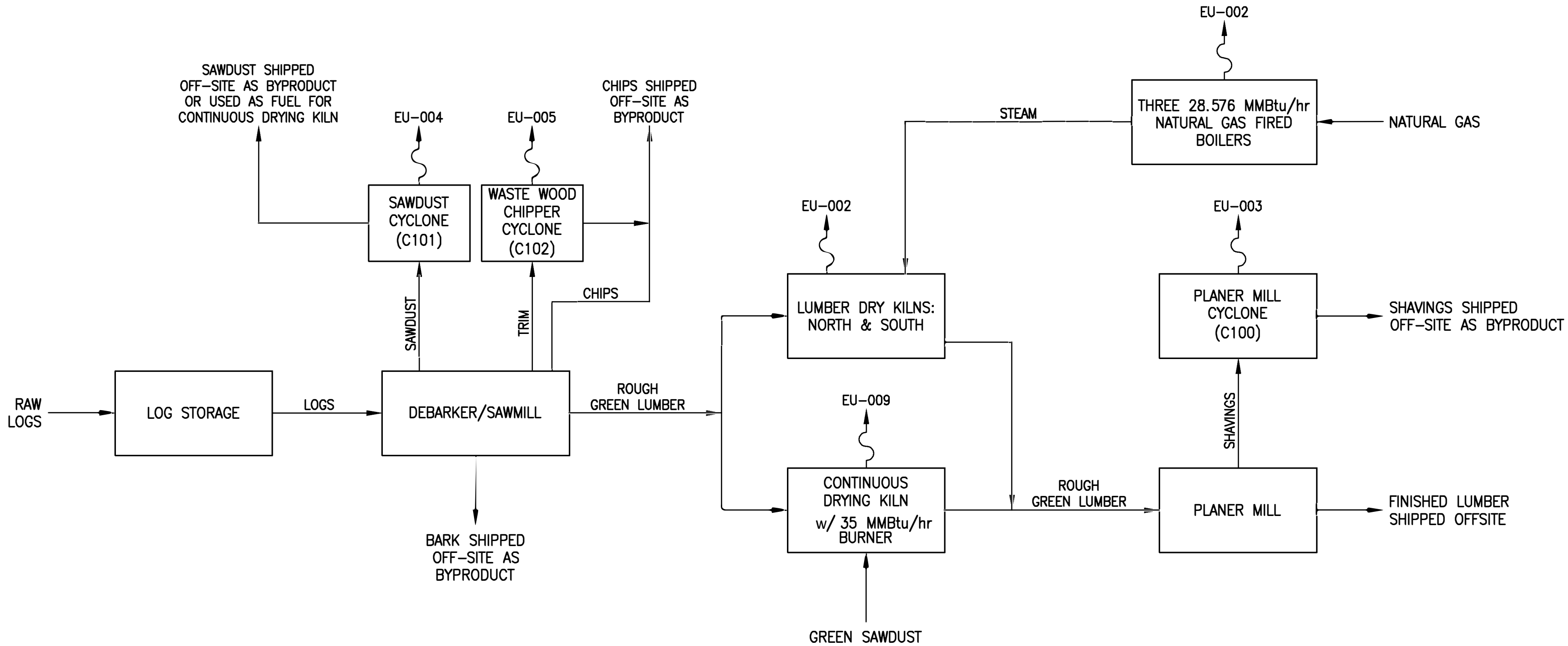
The existing permit contains operating restrictions, and enforceable requirements for emissions and operations monitoring, recordkeeping, and reporting. Southern Parallel Forest Products proposes the following additional requirement for the Continuous Dry Kiln within Table 6.1.

Table 6.1 Proposed Compliance

Emission Source Description	Emission Point ID	Proposed Compliance Requirements
Continuous Drying Kiln	EU 009	Monthly recordkeeping of lumber dried in EU 009 (110,000 MBf/yr on a 12-month rolling average basis) and records of proper operation and maintenance of the kilns.
		Operate the kiln following a temperature set point drying schedule as established by a site-specific operating and maintenance plan for the unit. (Propose that the plan be required within six months of issuance of the Temporary Authorization to Operate for the unit.)
		Ensure the VOC emission from the kiln does not exceed 3.80 lb/MBf (measured as carbon).

Appendix A

Facility Map and Process Flow Diagram

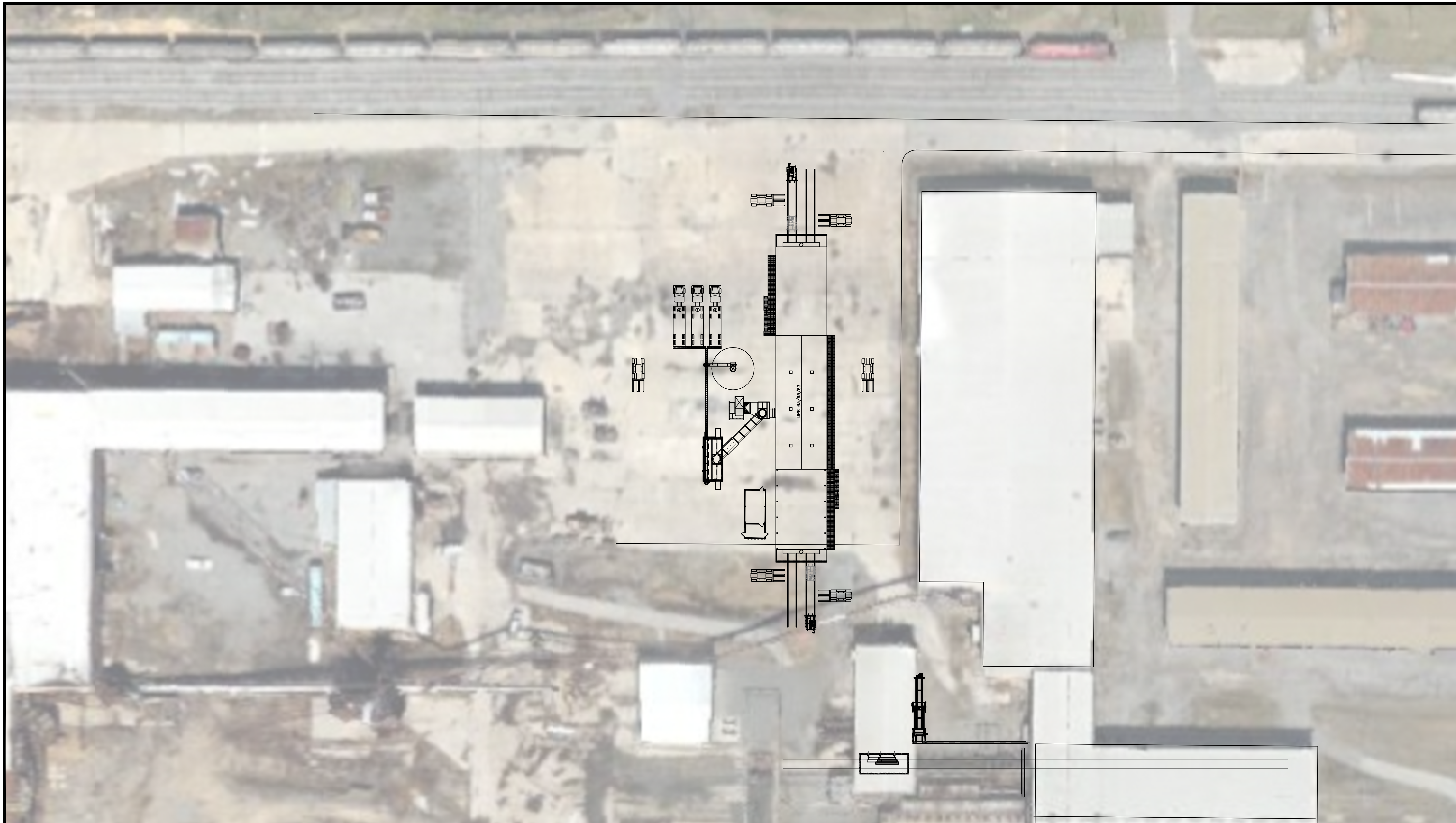


2540.100.G1

PROCESS FLOW DIAGRAM

SOUTHERN PARALLEL FOREST PRODUCTS
ALBERTVILLE, ALABAMA

Approved by:	CWR	GBMc	Project No.:	2540-17-030
Checked by:	CWR		Date: April 2018	04/18/2017
Drawn by:	IT		Scale:	---



REV.	BY	REVISION	DATE	REV.	BY	REVISION	DATE
D	WSS	REVISED TITLE BLOCK	04/10/18				
C	WSS	RELOCATED KILN 13'-0" WEST	03/05/18				
B	WSS	ADDED GOAL POST AND STICK SYSTEM	01/29/18				
A	WSS	ISSUED FOR REVIEW	01/10/18				

Tinsley Consulting Group, LLC
"Insight with Integrity"
PO BOX 21235 Hot Springs, AR 71903-1235 PHONE: (501) 525-1200 FAX: (501) 525-1214

SCALE 1/32"=1'
DWG. BY WSS
DATE 01/10/18
CKD. BY
REV DATE 04/10/18

SOUTHERN PARALLEL
ALBERTVILLE, AL

DUAL PATH KILN
DPK SITE LAYOUT
63/95/63 KILN CONFIGURATION

JOB NUMBER 289-1803
DWG. NO. M-50000-01
REV. D

Appendix B

Emission Calculations

PTE: Continuous Drying Kiln (Emission Unit No. 009)

Process Information

Emission Unit No.	Process	Production	Units	Notes
009	Continuous Drying Kiln	13.4	MBf/hr	[1]
		110,000	MBf/yr	[1]
	Wood Combustion	35.0	MMBtu/hr	[1]
		306,600	MMBtu/yr	[1]

Air Pollutant Emission Calculations

Pollutant	Emission Factor	Units	Potential Emissions CDK		Notes
			lb/hr	tpy	
PM(tot)	0.14	lb/MBF	2.25	7.70	[2][3][10]
PM_{10}(tot)	0.14	lb/MBF	2.25	7.70	[2][10]
$PM_{2.5}$(tot)	0.14	lb/MBF	2.25	7.70	[2][10]
VOC as C	3.80	lb/MBF	61.10	209.0	[4][10]
VOC (WPP1)	4.78	lb/MBF	76.91	263.1	[4][10]
SO_2	0.025	lb/MMBtu	1.05	3.83	[5][6][10]
CO	0.60	lb/MMBtu	25.20	91.98	[5][10]
NO_x	0.22	lb/MMBtu	9.24	33.73	[5][10]
Lead	0.000048	lb/MMBtu	2.02E-03	7.36E-03	[7][10]
CO_2	206.793356	lb/MMBtu	8,685	31,701	[8][10]
CH_4	0.015873	lb/MMBtu	0.67	2.43	[8][10]
N_2O	0.007937	lb/MMBtu	0.33	1.22	[8][10]
Total CO_2e	--	lb/MMBtu	8,801	32,125	[8][10]
Acetaldehyde	4.00E-02	lb/MBF	0.64	2.2	[9][10]
Acrolein	4.00E-03	lb/MBF	0.06	0.2	[9][10]
Formaldehyde	6.50E-02	lb/MBF	1.05	3.6	[9][10]
Methanol	1.80E-01	lb/MBF	2.89	9.9	[9][10]
Phenol	1.00E-02	lb/MBF	0.16	0.6	[9][10]
Propionaldehyde	4.00E-03	lb/MBF	0.06	0.2	[9][10]

Notes:

[1] Unit design capacity.

[2] Particulate related emissions are based on continuous kiln tests conducted on at Bibler Brothers Lumber Company, Russellville, AR. The Bibler Brothers data is for filterable PM only. The filterable PM emission factor is 0.068 lb/MBF. Condensable PM is based on unpublished data provided by a wood products industry group that recommends a ratio of condensable to filterable PM of 1.016. The condensable PM emission factor proposed is therefore 0.069 lb/MBF. The resulting PMtot emission factor is 0.138 lb/MBf (rounded here to 0.14 lb/MBf). PM_{10}(tot) and $PM_{2.5}$(tot) are conservatively assumed to be equal to PM(tot).

[3] PM emission limits are requested based on the kiln production rates, burner capacity, and emission factors in lieu of the ADEM 335-3-4-.04 process weight rule (PWR) equation that applies to TSP.

[4] Arkansas Department of Environmental Quality, "VOC emissions from Lumber Drying Kilns", October 31, 2014. See Appendix F.

[4] WPP1 VOC is an acronym for Wood Products Protocol 1 VOC and is calculated using the following eqn:
VOC (as WPP1) = [VOC as C x 1.225 + (1-0.65) x Methanol + Formaldehyde]

[5] AP42 Table 1.6-2 (9/03); wet wood. See Appendix F.

[6] SO_2 emission limits are requested based on the kiln production rates, burner capacity, and emission factors in lieu of the ADEM 335-3-5-.01 fuel combustion equation for SO_2.

[7] AP42 Table 1.6-4 (9/03). See Appendix F.

[8] GHG Emission factors are from Tables C-1 and C-2 of EPA's Mandatory Reporting Rule for Greenhouse Gases (40 CFR 98). Factors are converted from kg/MMBtu to lb/MMBtu using 2.20462 lb/kg.

[9] EPA/OAR/OAQPS/SPPD/NRG, "Development of a Provisional Emissions Calculations Tool for Inclusion in the PCWP ICR", June 30, 2017. Numerical Emission Factors Included in Provisional Calculations, Lumber Kiln: Softwood: Pine Species, NCASI Emission Factors 2014 (Direct Fired). See Appendix F.

[10] Hourly potential emission estimates include a 20% safety factor.

SAMPLE CALCULATIONS

Hourly PM Emission Rate:

$$\frac{13.4\ \text{MBf}}{\text{hr}} \times \frac{0.14\ \text{lb}}{\text{MBf}} \times 1.2 = \frac{2.25\ \text{lb}}{\text{hr}}$$

Annual PM Emission Rate

$$\frac{110000\ \text{MBf}}{\text{yr}} \times \frac{0.14\ \text{lb}}{\text{MBf}} \times \frac{\text{ton}}{2000\ \text{lb}} = \frac{7.70\ \text{ton}}{\text{yr}}$$

Appendix C

PSD Analysis Emission Calculations

Baseline Actual Emissions (BAE): Planer Mill Cyclone (Emission Unit No. 003)

Baseline Production

Planer Mill Hours of Operation between April 2016 and March 2018	Notes
7612	[1]

Baseline Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	BAE (tpy)	Notes
003	Planer Mill Cyclone (C100)	PM	12.95	24.64	[2]
		PM_{10}	11.01	20.95	[2]
		$PM_{2.5}$	6.48	12.32	[2]

Notes:

[1] Baseline hours of operation based on facility records.

[2] Emission factors from the 2016 emission inventory.

Baseline Actual Emissions (BAE): Sawmill Sawdust Transfer Cyclone (Emission Unit No. 004)

Baseline Production

Sawmill Hours of Operation between April 2016 and March 2018	Notes
5669	[1]

Baseline Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor	Units	BAE (tpy)	Notes
004	Sawmill Sawdust Cyclone (C101)	PM	9.68	lb/hr	13.72	[2]
		PM_{10}	8.23	lb/hr	11.66	[2]
		$PM_{2.5}$	4.84	lb/hr	6.86	[2]

Notes:

[1] Baseline hours of operation based on facility records.

[2] Emission factors from the 2016 emission inventory.

Baseline Actual Emissions (BAE): Waste Wood Chipper Cyclone (Emission Unit No. 005)

Baseline Production

Chipper Hours of Operation between April 2016 and March 2018	Notes
5669	[1]

Baseline Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	BAE (tpy)	Notes
005	Waste Wood Chipper Cyclone (C102)	PM	1.62	2.30	[2]
		PM_{10}	1.38	1.95	[2]
		$PM_{2.5}$	0.81	1.15	[2]

Notes:

[1] Baseline hours of operation based on facility records.

[2] Emission factors from the 2016 emission inventory.

Baseline Actual Emissions (BAE): Haul Roads (Fugitive)

Truck Traffic Details

Truck Material	Baseline Throughput (Apr 16 - Mar 18)	Throughput Units	Truck Capacity	Truck capacity factor units	Baseline Number of Trips	Round Trip Distance (miles/trip)	Comments
Log Handling	833,404	tons	28	tons/load	29,764	0.87	[1][2]
Green Sawdust	68,198	tons	13	tons/load	5,246	0.57	[1][2]
Shavings	43,395	tons	13	tons/load	3,338	0.57	[1][2]
Finished Lumber	182,280	MBf	36	MBf/load	5,130	0.13	[1][2]

Notes:

[1] Baseline material throughput based on facility records.

[2] Truck capacity, and round trip distance is based on 2016 emission inventory. Finished lumber potential truck capacity based on facility information.

Emission Factor Calculations

Truck Material	Average Truck Weight	Emission Factor[1]		
		PM	PM_{10}	$PM_{2.5}$
	(tons)	(lb/VMT)	(lb/VMT)	(lb/VMT)
Log Handling	21.5	2.09	0.60	5.97E-02
Green Sawdust	9.5	1.45	0.41	4.13E-02
Shavings	9.5	1.45	0.41	4.13E-02
Finished Lumber	25	2.24	0.64	6.39E-02

Notes:

[1] Unpaved route emission factor is based on Equations 1a and 2 of AP-42, Section 13.2.2 (November 2006), plus a 50% control efficiency for a watering plan.

Equations 1a and 2 (combined):

$$E = k \times \left(\frac{s}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right)$$

E =		size specific emission factor (lb/VMT)
s =	8.4	average surface material silt content (%), based on AP-42, Section 13.2.2, Table 13.2.2-1.
W =		mean vehicle weight (tons)
k =	4.9	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, PM.
	1.5	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, PM_{10}.
	0.15	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, $PM_{2.5}$.
a =	0.7	empirical constant (PM), AP-42, Section 13.2.2, Table 13.2.2-2.
	0.9	empirical constant (PM10/PM2.5), AP-42, Section 13.2.2, Table 13.2.2-2.
b =	0.45	empirical constant, AP-42, Section 13.2.2, Table 13.2.2-2.
P =	200	number of days in a year with at least 0.254 mm (0.01 in) of precipitation, AP-42, Section 13.2.2, Figure 13.2.2-1
Watering Control =	50%	watering plan control efficiency, which is implemented on days where no rain occurs.

Baseline Actual Emission Calculations

Truck Material	Baseline Vehicle Miles Traveled [1]	Baseline Actual Emissions[2]		
		PM	PM_{10}	$PM_{2.5}$
		(tpy)	(tpy)	(tpy)
Log Handling	25,895	13.55	3.86	0.39
Green Sawdust	2,990	1.08	0.31	0.03
Shavings	1,903	0.69	0.20	0.02
Finished Lumber	667	0.37	0.11	0.01
Total		**15.70**	**4.47**	**0.45**

Notes:

[1] VMT calculated from segment length times number of trips.

[2] Emissions calculated from emission factor (lb/VMT) * VMT / 2,000 lb/ton / 2 years

Baseline Production Year 1

Facility Information	2016									2017		
	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17
Sawmill (hrs)	220.00	238.50	230.25	202.75	261.00	230	236	239	248	251	228.5	271.25
Planermill (hrs)	236.50	231.00	251.00	229.00	308.50	304	318	316	298	347	330	368.5
Green Lumber Production (BF)	7,285,320	7,772,300	8,308,600	6,998,400	8,999,800	7,434,000	7,791,100	8,111,400	8,067,800	8,342,200	8,210,237	8,889,189
Kiln Production (BF)	7,131,296	7,460,969	7,832,579	6,594,244	8,413,971	7,155,888	7,777,717	7,691,528	7,246,747	8,537,913	7,676,400	7,961,472
Lumber Shipped - Truck (BF)	7,489,237	7,085,386	7,680,665	6,168,840	7,480,074	7,518,904	7,261,071	6,895,121	6,897,175	7,787,367	6,978,131	7,427,766
Logs Purchased (Tons)	33,096	34,556	32,903	30,035	36,163	30,670	34,647	35,746	35,399	34,497	31,954	36,061
Chips (Tons)	10,678	11,648	11,203	9,718	11,302	10,653	10,711	11,411	10,250	11,219	10,330	11,752
Bark (Tons)	1,617	1,637	1,633	1,447	1,782	1,437	1,568	1,749	1,810	1,770	1,814	1,765
Sawdust (Tons)	2,650	2,785	2,783	2,368	2,969	2,497	2,682	2,871	2,914	2,859	2,717	2,970
Shavings (Tons)	1,540	1,658	1,653	1,469	1,829	1,684	1,815	1,698	1,740	1,844	1,768	2,059

Baseline Production Year 2

Facility Information	2017									2018		MAX
	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan-18	Feb-18	**Mar-18**
Sawmill (hrs)	216.75	260.5	244.75	200.25	260.25	231.5	247.5	224	213.5	224.75	240.75	**248.75**
Planermill (hrs)	327.5	357.5	244.5	280.75	362	319.5	372.75	395.5	333	307.5	380.5	**393.5**
Green Lumber Production (BF)	7,681,190	8,755,720	7,985,760	7,623,660	10,100,930	8,714,159	9,304,079	8,515,924	7,939,005	7,392,254	9,746,980	**10,449,754**
Kiln Production (BF)	9,101,343	8,192,858	6,347,735	7,826,815	9,015,335	7,982,704	9,066,896	8,605,588	8,767,276	6,032,628	8,756,822	**10,031,468**
Lumber Shipped - Truck (BF)	7,611,223	8,673,955	6,678,706	7,348,727	9,043,460	7,136,709	8,554,122	8,582,975	7,515,807	7,004,589	7,010,388	**10,449,234**
Logs Purchased (Tons)	29,337	34,029	30,236	31,504	44,739	38,351	32,747	37,260	31,039	37,901	36,325	**44,211**
Chips (Tons)	10,267	11,513	9,936	9,418	13,144	11,613	10,745	10,279	10,245	9,635	11,631	**12,609**
Bark (Tons)	1,351	1,531	1,511	1,590	2,048	1,630	1,696	1,725	1,687	1,720	2,229	**2,176**
Sawdust (Tons)	2,456	2,858	2,442	2,280	3,013	2,929	3,221	2,984	2,872	2,901	3,545	**3,630**
Shavings (Tons)	1,884	2,081	1,530	1,528	2,042	1,737	1,973	2,090	1,851	1,452	2,067	**2,402**

Baseline Production Totals

Facility Information	Apr-16 through Mar-18
Sawmill (hrs)	5,669
Planermill (hrs)	7,612
Green Lumber Production (BF)	200,419,761
Kiln Production (BF)	191,208,193
Lumber Shipped - Truck (BF)	182,279,632
Logs Purchased (Tons)	833,404
Chips (Tons)	261,909
Bark (Tons)	40,926
Sawdust (Tons)	68,198
Shavings (Tons)	43,395

Projected Actual Emissions (PAE): Planer Mill Cyclone (Emission Unit No. 003)

Projected Production

Projected Hours of Operation (hr/yr)	Lumber Production (MBF/yr)	Notes
4641	160,000	[1]

Projected Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	PAE (tpy)	Notes
003	Planer Mill Cyclone (C100)	PM	12.95	30.05	[2]
		PM_{10}	11.01	25.54	[2]
		$PM_{2.5}$	6.48	15.03	[2]

Notes:

[1] Projected hours of operation conservatively estimated as the maximum operating hours without a change in shift schedule.

[2] Emission factors from the 2016 emission inventory.

Projected Actual Emissions (PAE): Sawmill Sawdust Transfer Cyclone (Emission Unit No. 004)

Projected Production

Projected Hours of Operation (hr/yr)	Lumber Production (MBF/yr)	Notes
3672	160,000	[1]

Projected Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	PAE (tpy)	Notes
004	Sawmill Sawdust Cyclone (C101)	PM	9.68	17.77	[2]
		PM_{10}	8.23	15.11	[2]
		$PM_{2.5}$	4.84	8.89	[2]

Notes:

[1] Projected hours of operation conservatively estimated as the maximum operating hours without a change in shift schedule.

[2] Emission factors from the 2016 emission inventory.

Projected Actual Emissions (PAE): Waste Wood Chipper Cyclone (Emission Unit No. 005)

Projected Production

Projected Hours of Operation (hr/yr)	Lumber Production (MBF/yr)	Notes
3672	160,000	[1]

Projected Actual Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	PAE (tpy)	Notes
005	Waste Wood Chipper Cyclone (C102)	PM	1.62	2.97	[2]
		PM_{10}	1.38	2.53	[2]
		$PM_{2.5}$	0.81	1.49	[2]

Notes:

[1] Projected hours of operation conservatively estimated as the maximum operating hours without a change in shift schedule.

[2] Emission factors from the 2016 emission inventory.

Projected Actual Emissions (PAE): Haul Roads

Truck Traffic Details

Truck Material	Material Throughput	Throughput Units	Truck Capacity	Truck capacity factor units	Number of Trips	Round Trip Distance (miles/trip)	Comments
Log Handling	731,538	tpy	28	tons/load	26,126	0.87	[1][2]
Green Sawdust	59,862	tpy	13	tons/load	4,605	0.57	[1][2]
Shavings	38,091	tpy	13	tons/load	2,930	0.57	[1][2]
Finished Lumber	160,000	MBf/yr	36	MBf/load	4,503	0.13	[1][2]

Notes:

[1] Maximum production the facility is projecting 160,000 MBf of dry lumber. The material throughput is based on the baseline material production to finished lumber production ratios applied to the projected 160,000 MBf of dry lumber production.

[2] Truck capacity, and round trip distance is based on 2016 emission inventory. Finished lumber potential truck capacity based on facility information.

Emission Factor Calculations

Truck Material	Average Truck Weight (tons)	Emission Factor[1] PM Maximum (lb/VMT)	PM_{10} Maximum (lb/VMT)	$PM_{2.5}$ Maximum (lb/VMT)
Log Handling	21.5	2.09	0.60	5.97E-02
Green Sawdust	9.5	1.45	0.41	4.13E-02
Shavings	9.5	1.45	0.41	4.13E-02
Finished Lumber	25	2.24	0.64	6.39E-02

Notes:

[1] Unpaved route emission factor is based on Equations 1a and 2 of AP-42, Section 13.2.2 (November 2006), plus 50% control efficiency for a watering plan.

Equations 1a and 2 (combined):

$$E = k \times \left(\frac{s}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right)$$

E =		size specific emission factor (lb/VMT)
s =	8.4	average surface material silt content (%), based on AP-42, Section 13.2.2, Table 13.2.2-1.
W =		mean vehicle weight (tons)
k =	4.9	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2.
	1.5	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, PM_{10}.
	0.15	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, $PM_{2.5}$.
a =	0.7	empirical constant (PM), AP-42, Section 13.2.2, Table 13.2.2-2.
	0.9	empirical constant (PM10/PM2.5), AP-42, Section 13.2.2, Table 13.2.2-2.
b =	0.45	empirical constant, AP-42, Section 13.2.2, Table 13.2.2-2.
P =	200	number of days in a year with at least 0.254 mm (0.01 in) of precipitation, AP-42, Section 13.2.2, Figure 13.2.2-1
Watering Control =	50%	watering plan control efficiency, which is implemented on days where no rain occurs.

Projected Actual Emission Calculations

Truck Material	Vehicle Miles Traveled [1] Maximum	Projected Actual Estimated Emissions[2] PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Log Handling	22,730	23.79	6.78	0.68
Green Sawdust	2,625	1.90	0.54	0.05
Shavings	1,670	1.21	0.35	0.03
Finished Lumber	585	0.66	0.19	0.02
Total		**27.56**	**7.86**	**0.79**

Notes:

[1] VMT calculated from segment length times number of trips.

[2] Emissions Calculated from emission factor (lb/VMT) * VMT / 2,000 lb/ton.

Emissions Related to the Project: Haul Roads (Fugitive)

Truck Traffic Details

Truck Material	Material Throughput	Throughput Units	Truck Capacity	Truck capacity factor units	Number of Trips	Round Trip Distance (miles/trip)	Comments
Log Handling	201,012	tpy	28	tons/load	7,179	0.87	[1][2]
Green Sawdust	16,304	tpy	13	tons/load	1,254	0.57	[1][2]
Shavings	9,266	tpy	13	tons/load	713	0.57	[1][2]
Finished Lumber	34,609	MBf/yr	36	MBf/load	974	0.13	[1][2]

Notes:

[1] Finished lumber and material throughput production related to the project are assumed to be the projected actual production above the could have accommodated production.

[2] Truck capacity, and round trip distance is based on 2016 emission inventory. Finished lumber capacity based on facility information.

Emission Factor Calculations

Truck Material	Average Truck Weight (tons)	Emission Factor[1] PM Maximum (lb/VMT)	PM_{10} Maximum (lb/VMT)	$PM_{2.5}$ Maximum (lb/VMT)
Log Handling	21.5	2.09	0.60	5.97E-02
Green Sawdust	9.5	1.45	0.41	4.13E-02
Shavings	9.5	1.45	0.41	4.13E-02
Finished Lumber	25	2.24	0.64	6.39E-02

Notes:

[1] Unpaved route emission factor is based on Equations 1a and 2 of AP-42, Section 13.2.2 (November 2006), plus a 50% control efficiency for a watering plan.

Equations 1a and 2 (combined):

$$E = k \times \left(\frac{s}{12}\right)^{a} \times \left(\frac{W}{3}\right)^{b} \times \left(\frac{365 - P}{365}\right)$$

E =		size specific emission factor (lb/VMT)
s =	8.4	average surface material silt content (%), based on AP-42, Section 13.2.2, Table 13.2.2-1.
W =		mean vehicle weight (tons)
k =	4.9	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2.
	1.5	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, PM_{10}.
	0.15	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, $PM_{2.5}$.
a =	0.7	empirical constant (PM), AP-42, Section 13.2.2, Table 13.2.2-2.
	0.9	empirical constant (PM10/PM2.5), AP-42, Section 13.2.2, Table 13.2.2-2.
b =	0.45	empirical constant, AP-42, Section 13.2.2, Table 13.2.2-2.
P =	200	number of days in a year with at least 0.254 mm (0.01 in) of precipitation, AP-42, Section 13.2.2, Figure 13.2.2-1
Watering Control =	50%	watering plan control efficiency, which is implemented on days where no rain occurs.

Emissions Related to the Project Emission Calculations

Truck Material	Vehicle Miles Traveled [1]	Emissions Related to the Project[2] PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Log Handling	6,246	6.54	1.86	0.19
Green Sawdust	715	0.52	0.15	0.01
Shavings	406	0.29	0.08	0.01
Finished Lumber	127	0.14	0.04	0.00
Total		**7.49**	**2.14**	**0.21**

Notes:

[1] VMT calculated from segment length times number of trips.

[2] Emissions Calculated from emission factor (lb/VMT) * VMT / 2,000 lb/ton.

Could have Accommodated (CHA): Planer Mill Cyclone (Emission Unit No. 003)

Could have Accommodated Production

Baseline Annualized Month	Lumber Production (MBf/month)	Hours of Operation (hr/mo)	CHA Annualized Lumber Production (MBf/yr)	CHA Annualized Hours of Operation (hr/yr)	Notes
March-18	10,031	394	120,378	4,722	[1]

Could have Accommodated Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	CHA (tpy)	Notes
003	Planer Mill Cyclone (C100)	PM	12.95	30.57	[2]
		PM_{10}	11.01	25.99	[2]
		$PM_{2.5}$	6.48	15.29	[2]

Notes:

[1] Could have accommodated is based on the highest month finished lumber production during the baseline period (March 2018). The month's production and operating hours are annualized by multiplying by 12 months.

[2] Emission factors based on 2016 emission inventory.

Could have Accommodated (CHA): Sawmill Sawdust Transfer Cyclone (Emission Unit No. 004)

Could have Accommodated Production

Baseline Annualized Month	Lumber Production (MBf/month)	Hours of Operation (hr/mo)	CHA Annualized Lumber Production (MBf/yr)	CHA Annualized Hours of Operation (hr/yr)	Notes
March-18	10,450	249	125,397	2,985	[1]

Could have Accommodated Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	CHA (tpy)	Notes
004	Sawmill Sawdust Cyclone (C101)	PM	9.68	14.45	[2]
		PM_{10}	8.23	12.28	[2]
		$PM_{2.5}$	4.84	7.22	[2]

Notes:

[1] Could have accommodated is based on the highest month green lumber production during the baseline period (March 2018). The month's production and operating hours are annualized by multiplying by 12 months.

[2] Emission factors based on 2016 emission inventory.

CHA: Waste Wood Chipper Cyclone (Emission Unit No. 005)

Could have Accommodated Production

Baseline Annualized Month	Lumber Production (MBf/month)	Hours of Operation (hr/mo)	CHA Annualized Lumber Production (MBf/yr)	CHA Annualized Hours of Operation (hr/yr)	Notes
March-18	10,450	249	125,397	2,985	[1]

Could have Accommodated Emission Calculations

Emission Unit No.	Operation	Pollutant	Emission Factor (lb/hr)	CHA (tpy)	Notes
005	Waste Wood Chipper Cyclone (C102)	PM	1.62	2.42	[2]
		PM_{10}	1.38	2.06	[2]
		$PM_{2.5}$	0.81	1.21	[2]

Notes:

[1] Could have accommodated is based on the highest month green lumber production during the baseline period (March 2018). The month's production and operating hours are annualized by multiplying by 12 months.

[2] Emission factors based on 2016 emission inventory.

Could have Accommodated (CHA): Haul Roads (Fugitive)

Truck Traffic Details

Truck Material	March 2018 Material Throughput	CHA Annualized Material Throughput	Throughput Units	Truck Capacity	Truck capacity factor units	Number of Trips	Round Trip Distance (miles/trip)	Comments
Log Handling	44,211	530,526	ton	28	tons/load	18,947	0.87	[1][2]
Green Sawdust	3,630	43,558	ton	13	tons/load	3,351	0.57	[1][2]
Shavings	2,402	28,825	ton	13	tons/load	2,217	0.57	[1][2]
Finished Lumber	10,449	125,391	MBf	36	MBf/load	3,529	0.13	[2]

Notes:

[1] Could have accommodated material throughput is based on the highest month material production during the baseline period (March 2018). The material production for that month is annualized by multiplying by 12 months.

[2] Truck capacity, and round trip distance is based on 2016 emission inventory. Finished lumber capacity based on facility information.

Emission Factor Calculations

Truck Material	Average Truck Weight (tons)	Emission Factor[1] PM Maximum (lb/VMT)	PM_{10} Maximum (lb/VMT)	$PM_{2.5}$ Maximum (lb/VMT)
Log Handling	21.5	2.09	0.60	5.97E-02
Green Sawdust	9.5	1.45	0.41	4.13E-02
Shavings	9.5	1.45	0.41	4.13E-02
Finished Lumber	25	2.24	0.64	6.39E-02

Notes:

[1] Unpaved route emission factor is based on Equations 1a and 2 of AP-42, Section 13.2.2 (November 2006), plus 50% control efficiency for a watering plan.

Equations 1a and 2 (combined):

$$E = k \times \left(\frac{s}{12}\right)^a \times \left(\frac{W}{3}\right)^b \times \left(\frac{365 - P}{365}\right)$$

E =		size specific emission factor (lb/VMT)
s =	8.4	average surface material silt content (%), based on AP-42, Section 13.2.2, Table 13.2.2-1.
W =		mean vehicle weight (tons)
k =	4.9	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2.
	1.5	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, PM_{10}.
	0.15	particle size multiplier, AP-42, Section 13.2.2, Table 13.2.2-2, $PM_{2.5}$.
a =	0.7	empirical constant (PM), AP-42, Section 13.2.2, Table 13.2.2-2.
	0.9	empirical constant (PM10/PM2.5), AP-42, Section 13.2.2, Table 13.2.2-2.
b =	0.45	empirical constant, AP-42, Section 13.2.2, Table 13.2.2-2.
P =	200	number of days in a year with at least 0.254 mm (0.01 in) of precipitation, AP-42, Section 13.2.2, Figure 13.2.2-1
Watering Control =	50%	watering plan control efficiency, which is implemented on days where no rain occurs.

Could have Accommodated Emission Calculations

Truck Material	Vehicle Miles Traveled [1]	Could have Accommodated Emission[2] PM (tpy)	PM_{10} (tpy)	$PM_{2.5}$ (tpy)
Log Handling	16,484	17.25	4.92	0.49
Green Sawdust	1,910	1.38	0.39	0.04
Shavings	1,264	0.92	0.26	0.03
Finished Lumber	459	0.51	0.15	0.01
Total		**20.07**	**5.72**	**0.57**

Notes:

[1] VMT calculated from segment length times number of trips.

[2] Emissions Calculated from emission factor (lb/VMT) * VMT / 2,000 lb/ton.

Appendix D

Permit Application Forms

ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT (AIR DIVISION)

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Facility Number ☐☐☐ - ☐☐☐☐

CONSTRUCTION/OPERATING PERMIT APPLICATION
FACILITY IDENTIFICATION FORM

1. Name of Facility, Firm, or Institution: Southern Parallel Forest Products

Facility Physical Location Address

Street & Number: 660 Industrial Boulevard

City: Albertville **County:** **Zip:** 35950

Facility Mailing Address (If different from above)

Address or PO Box:

City: **State:** **Zip:**

Owner's Business Mailing Address

2. Owner: Southern Parallel Forest Products

Street & Number: 660 Industrial Boulevard **City:** Albertville

State: AL **Zip:** 35950 **Telephone:** 256.891.5981

Responsible Official's Business Mailing Address

3. Responsible Official: Andrew Moore **Title:** Vice President of Operations

Street & Number: 660 Industrial Boulevard

City: Albertville **State:** AL **Zip:** 35950

Telephone Number: 256.891.5981 **E-mail Address:** andy.moore@southerparallelfp.com

Plant Contact Information

4. Plant Contact: Andrew Moore **Title:** Vice President of Operations

Telephone Number: 256.891.5981 **E-mail Address:** andy.moore@southerparallelfp.com

5. Location Coordinates:

UTM 3788333 **E-W** 574729 **N-S**

Latitude/Longitude 34.233399° **LAT** -86.188572 **LONG**

6. **Permit application is made for:**

☐ Existing source (initial application)
☒ Modification
☐ New source (to be constructed)
☐ Change of ownership
☐ Change of location
☐ Other (specify) ____________________

Existing source (permit renewal)

If application is being made to construct or modify, please provide the name and address of installer or contractor

Tinsley Consulting Group, LLC

1820-D Higdon Ferry Rd.

Hot Springs, AR 71913 Telephone 501.525.1200

Date construction/modification to begin August 2018 to be completed January 2019

7. **Permit application is being made to obtain the following type permit:**

☒ Air permit
☐ Major source operating permit
☐ Synthetic minor source operating permit
☐ General permit

8. **Indicate the number of each of the following forms attached and made a part of this application: (if a form does not apply to your operation indicate "N/A" in the space opposite the form). Multiple forms may be used as required.**

N/A	ADEM 104 - INDIRECT HEATING EQUIPMENT
1	ADEM 105 - MANUFACTURING OR PROCESSING OPERATION
N/A	ADEM 106 - REFUSE HANDLING, DISPOSAL, AND INCINERATION
N/A	ADEM 107 - STATIONARY INTERNAL COMBUSTION ENGINES
N/A	ADEM 108 - LOADING, STORAGE & DISPENSING LIQUID & GASEOUS ORGANIC COMPOUNDS
N/A	ADEM 109 - VOLATILE ORGANIC COMPOUND SURFACE COATING EMISSION SOURCES
N/A	ADEM 110 - AIR POLLUTION CONTROL DEVICE
N/A	ADEM 112 - SOLVENT METAL CLEANING
N/A	ADEM 438 - CONTINUOUS EMISSION MONITORS
N/A	ADEM 437 - COMPLIANCE SCHEDULE

9. **General nature of business: (describe and list appropriate standard industrial classification (SIC) and North American Industry Classification System (NAICS) (www.naics.com) code(s)):**

The facility operates a softwood sawmill to produce dimensional lumber, NAICS 321113-Sawmills and SIC 2421 - Sawmills and Planing Mills, General.

10. For those making application for a synthetic minor or major source operating permit, please summarize each pollutant emitted and the emission rate for the pollutant. Indicate those pollutants for which the facility is major.

Regulated pollutant	Potential Emissions* (tons/year)	Major source? yes/no

*Potential emissions are either the maximum allowed by the regulations or by permit, or, if there is no regulatory limit, it is the emissions that occur from continuous operation at maximum capacity.

11. <u>For those applying for a major source operating permit</u>, indicate the compliance status by program for each emission unit or source and the method used to determine compliance. Also cite the specific applicable requirement.

Emission unit or source: ______________________________
(description)

Emission Point No.	Pollutant[4]	Standard	Program[1]	Method used to determine compliance	Compliance Status	
					IN[2]	OUT[3]

[1]PSD, non-attainment NSR, NSPS, NESHAP (40 CFR Part 61), NESHAP (40 CFR Part 63), accidental release (112(r)),SIP regulation, Title IV, Enhanced Monitoring, Title VI, Other (specify)

[2]Attach compliance plan

[3]Attach compliance schedule (ADEM Form-437)

[4]Fugitive emissions must be included as separate entries

12. **List all insignificant activities and the basis for listing them as such (i.e., less than the insignificant activity thresholds or on the list of insignificant activities). Attach any documentation needed, such as calculations. No unit subject to an NSPS, NESHAP or MACT standard can be listed as insignificant.**

Insignificant Activity	Basis
N/A	

13. List and explain any exemptions from applicable requirements the facility is claiming:

a. No exemptions requested, however, more stringent industry-specific PM and SO2 limits

b. are requested in lieu of PWR and fuel combustion maximum allowable limits. See the

c. Regulatory Applicability section for more details.

d.

e.

f.

g.

h.

i.

14. List below other attachments that are a part of this application(all supporting engineering calculations must be appended):

a. Application Summary

b. Process Description

c. Regulatory Applicability including PSD requirements, BACT, and Impacts Analysis

d. Proposed Compliance

e. Appendix A- Facility Map and Process Flow Diagram

f. Appendix B- Emission Calculations

g. Appendix C- PSD Analysis Emission Calculations

h. Appendix D - ADEM Permit Application Forms

i. Appendix E - RBLC Results

Appendix F - Emission Factor References

I CERTIFY UNDER PENALTY OF LAW THAT, BASED ON INFORMATION AND BELIEF FORMED AFTER REASONABLE INQUIRY, THE STATEMENTS AND INFORMATION CONTAINED IN THIS APPLICATION ARE TRUE, ACCURATE AND COMPLETE.

I ALSO CERTIFY THAT THE SOURCE WILL CONTINUE TO COMPLY WITH APPLICABLE REQUIREMENTS FOR WHICH IT IS IN COMPLIANCE, AND THAT THE SOURCE WILL, IN A TIMELY MANNER, MEET ALL APPLICABLE REQUIREMENTS THAT WILL BECOME EFFECTIVE DURING THE PERMIT TERM AND SUBMIT A DETAILED SCHEDULE, IF NEEDED FOR MEETING THE REQUIREMENTS.

[signature]	Vice President of Operations	4/20/2018
SIGNATURE OF RESPONSIBLE OFFICIAL	**TITLE**	**DATE**

PERMIT APPLICATION
FOR
MANUFACTURING OR PROCESSING OPERATION

-	-	

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1. **Name of firm or organization:** Southern Parallel Forest Products- Albertville Sawmill

2. **Briefly describe the operation of this unit or process in your facility: (separate forms are to be submitted for each type of process or for multiple units of one process type. If the unit or process receives input material from, or provides input material to, another operation, please indicate the relationship between the operations.) An application should be completed for each alternative operating scenario.**

   Operating scenario number 1

   After the sawmill, green lumber is sent to the lumber kilns for drying. The Albertville Mill has two steam heated batch kilns, Lumber Dry Kilns: North and South (Emission Unit No. 002). The steam for the batch kilns are provided by Three 28.576 MMBtu/hr Natural Gas-Fired Boilers (Emission Unit No. 007). A Continuous Drying Kiln (Emission Unit No. 009), direct fired using a 35 MMBtu/hr green sawdust burner, will also be used.

   Dried rough lumber is sent from the kilns to be finished in the Planer Mill Operation (Emission Unit No. 003).

3. **Type of unit or process (e.g., calcining kiln, cupola furnace):** Continuous Dry Kiln (Emission Unit No. 009)

   Make: TBD **Model:** TBD

   Rated process capacity (manufacturer's or designer's guaranteed maximum) in pounds/hour: 134 MBf/hr

   Manufactured date: TBD **Proposed installation date:** Aug/Sep 2018

   Original installation date (if existing): NA

   Reconstruction or Modification date (if applicable): NA

4. **Normal operating schedule:**

   Hours per day: 24 **Days per week:** 7 **Weeks per year:** 52

   Peak production season (if any): NA

5. **Materials (feed input) used in unit or process (include solid fuel materials used, if any):**

Material	Process Rate Average (lb/hr)	Maximum (lb/hr)	Quantity tons/year
Dried Lumber	12.9 MBf	13.4 MBf	110, 000 MBf
Wood Combustion	26.4 MMBtu	35.0 MMBtu	306,600 MMBtu

6. **Total heat input capacity of process heating equipment (exclude fuel used by indirect heating equipment previously described on Form ADEM-104):__________MMBtu/hr**

Fuel	Heat Content	Units	Max. % Sulfur	Max. % Ash	Grade No. [fuel oil only]	Supplier [used oil only]
Coal		Btu/lb				
Fuel Oil		Btu/gal				
Natural Gas		Btu/ft^3				
L. P. Gas		Btu/ft^3				
Wood	4,176	Btu/lb	<1	NA	NA	NA
Other (specify)						

7. **Products of process or unit:**

Products	Quantity/year	Units of production
Dried Lumber	110	MMBF

8. **For each regulated pollutant, describe any limitations on source operation which affects emissions or any work practice standard (attach additional page if necessary):**

It is requested that the particulate matter (PM) and sulfur dioxide (SO2) emission limitations for this source be based on industry specific emission factors provided in this application in lieu of using the ADEM general industry process weight rule (PWR) to derive PM emissions and fuel combustion emission limitations for SO2.

9. Is there any emission control equipment on this emission source?

☐ Yes ☒ No (Where a control device exists, Form ADEM-110 must be completed and attached).

10. Air contaminant emission points: (Each point of emission should be listed separately and numbered so that it can be located on the attached flow diagram):

Emission Point	Height Above Grade (Feet)	Base Elevation (Feet)	Stack Diameter (Feet)	Stack Gas Exit Velocity (Feet/Sec)	Volume of Gas Discharged (ACFM)	Exit Temperature (°F)
EU No. 009* (stack 1)	35	1045	2.33	23.45	6000	140
EU No. 009* (stack 2)	35	1045	2.33	23.45	6000	140
EU No. 009* (door 1)	8.5	1045	NA - Fugitive	NA - Fugitive	NA - Fugitive	NA - Fugitive
EU No. 009* (door 2)	8.5	1045	NA - Fugitive	NA - Fugitive	NA - Fugitive	NA - Fugitive
		*Kiln Design not yet finalized				

*** Std temperature is 68°F - Std pressure is 29.92" in Hg.**

11. **Air contaminants emitted: Basis of estimate (material balance, stack test, emission factor, etc.) must be clearly indicated on calculations appended to this form. Fugitive emissions must be included and calculations must be appended.**

Emission Point	Pollutants	Potential Emissions (lb/hr)	Potential Emissions (Tons/yr)	Potential Emissions Basis of Calculation	Regulatory Emission Limit (lb/hr)	Regulatory Emission Limit (units of standard)
EU No. 009	VOC (WPP1)	76.91	263.1	ADEQ		
EU No. 009	PM	2.25	7.70	NCDENR	29.09	ADEM 335-3-4-.04(1)
EU No. 009	PM10	2.25	7.70	NCDENR		
EU No. 009	PM2.5	2.25	7.70	NCDENR		
EU No. 009	SO2	1.05	3.83	AP-42 1.6-2	140	ADEM 335-3-5-.01(1)
EU No. 009	CO	25.20	91.98	AP-42 1.6-2		
EU No. 009	NOx	9.24	33.73	AP-42 1.6-2		
EU No. 009	HAPs (see attached emission summary for HAP breakdown)	4.87	16.67	Sum of HAPs		

12. **Using a flow diagram:**
    1. **(1) Illustrate input of raw materials,**
    2. **(2) Label production processes, process fuel combustion, process equipment and air pollution control equipment,**
    3. **(3) Illustrate locations of air contaminant release so that emission points under item 10 can be identified.**

[X] **(Check box if extra pages are attached)**
Process flow diagram

13. Is this unit or process in compliance with all applicable air pollution rules and regulations?

☒ Yes ☐ No

(if "no", a compliance schedule, Form ADEM-437 must be completed and attached.)

14. Does the input material or product from this process or unit contain finely divided materials which could become airborne?

☐ Yes ☒ No

15. If "yes", is this material stored in piles or in some other facility as to make possible the creation of fugitive dust problems?

☐ Yes ☒ No

List storage piles or other facility (if any):

Type of material	Particle size (diameter or screen size)	Pile size or facility (average tons)	Methods utilized to control fugitive emissions (wetted, covered, etc.)

Name of person preparing application: Lisa Reed, GBMc & Associates

Signature: Lisa M. Reed Date: 5/2/18

Appendix E

RBLC Results

RBLC RESULTS:

RBLC Search From January 1, 2008 through April 5, 2018 for process, "30.8", specific to wood burning, direct fired kilns.

RBLCID	FACILITY_NAME	PROCESS_NAME	PRIMARY_FUEL	POLLUTANT	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT	CONTROL_METHOD_DESCRIPTION
AL-0257	WEST FRASER-OPELIKA LUMBER MILL	Two(2) 87.5 MMBF/YR Continuous kilns with a 35 MMBtu/hr direct-fired wood burner	Wood Shavings	Volatile Organic Compounds (VOC)	3.76	LB/MBF	175	K/12 MONTHS	
AL-0258	WEST FRASER, INC. - MAPLESVILE MILL	Two(2) 100 MMBF/Y Continuous direct fired kiln	Wood Residuals	Volatile Organic Compounds (VOC)	3.76	LB/MBF	0		
AL-0260	THE WESTERVELT COMPANY	Two (2) 125 MMBtu/Hr. Wood-fired Boilers	Wood Residuals	Volatile Organic Compounds (VOC)	0.5	LB/MMBTU	0.5	LB/MMBTU	
AL-0273	MILLPORT WOOD PRODUCTS FACILITY	Continuous direct-lumber dry kiln	Green sawdust	Volatile Organic Compounds (VOC)	4.7	LB	0		Proper maintenance & operating practice requirements. Test method information: Method 18/25.
AL-0305	RESOLUTE FOREST PRODUCTS - ALABAMA SAWMILL	Continuous Direct-Fired Lumber Dry Kilns with 35 mmbtu/hr Wood Fired Burner	Wood	Volatile Organic Compounds (VOC)	3.76	LB/MBF	0		
AL-0311	MILLPORT WOOD PRODUCTS FACILITY	THREE CONTINUOUS DIRECT-FIRED LUMBER DRY KILNS, CDK-4/X023A, CDK-5/X023B, CDK-6/X023C	WOOD-SAWDUST	Volatile Organic Compounds (VOC)	4.7	LB/MBF AS WPP1	0		OPERATING AND MAINTENANCE PRACTICES
AL-0312	BELK CHIP-N-SAW FACILITY	115,000 MBF/YR CDK D (ES-006) WITH 35 MMBTU/HR WOOD-FIRED AND 7 MMBTU/HR NG-FIRED BURNERS	WOOD-SAWDUST	Volatile Organic Compounds (VOC)	5.49	LB/MBF AS WPPI VOC	0		OPERATING AND MAINTANCE PRACTICES MEASURE LUMBER MOISTURE CONTENT
AL-0312	BELK CHIP-N-SAW FACILITY	115,000 MBF/YR CDK E (ES-009) WITH 35 MMBTU/HR WOOD-FIRED AND 7 MMBTU/HR NG-FIRED BURNERS	WOOD-SAWDUST	Volatile Organic Compounds (VOC)	5.49	LB/MBF AS WPP1 VOC	0		OPERATING AND MAINTENANCE PRACTICES LUMBER MOISTURE CONTENT MEASUREMENT
*AL-0322	COTTONTON SAWMILL	Continuous Direct-fired Lumber Dry Kiln with 34 MMBtu/hr Wood-fired burner	Biomass	Volatile Organic Compounds (VOC)	4.21	LB/MBF	0		Good combustion practices and proper maintenance
AR-0101	BIBLER BROTHERS LUMBER COMPANY	SN-07G AND SN-13G CONTINOUS OPERATING KILNS	WOOD RESIDUE	Volatile Organic Compounds (VOC)	3.8	LB/MBF VOC	46.5	LB VOC/H/KILN	
AR-0120	OLA	Dry Kiln No. 3 (SN-06)	None	Volatile Organic Compounds (VOC)	33.3	LB/H	0		
AR-0120	OLA	Drying Kiln No. 4 (SN-12)	None	Volatile Organic Compounds (VOC)	33.2	LB/H	0		
AR-0120	OLA	Drying Kiln No. 5 (SN-21)	wood residue	Volatile Organic Compounds (VOC)	23.5	LB/H	0		
AR-0127	DELTIC TIMBER CORPORATION - OLA	DIRECT-FIRED CONTINUOUS KILN NO. 5		Volatile Organic Compounds (VOC)	38.2	LB/H	0		PROPER DRYING SCHEDULE AND A TEMPERATURE BASED ON MOISTURE CONTENT OF THE LUMBER TO BE DRIED AND THE MANUFACTURER'S SPECIFICATIONS
AR-0143	CADDO RIVER LLC	CONTINUOUS LUMBER DRYING KILNS	WOOD	Volatile Organic Compounds (VOC)	53.2	LB/H	220.4	T/YR	
AR-0147	ANTHONY FOREST PRODUCTS COMPANY, LLC	Dual Path Kiln #3	sawdust	Volatile Organic Compounds (VOC)	3.8	LB/MBF	0		
AR-0148	CADDO RIVER LLC	Dual Path Kiln # 3	Wood	Volatile Organic Compounds (VOC)	3.8	LB/MBF	53.2	LB/HR	
FL-0340	PERRY MILL	Direct-fired lumber drying kiln	Waste wood	Volatile Organic Compounds (VOC)	3.5	LB/THOUSAND BOARD FT	0		At a minimum, the permittee shall operate the kiln in accordance with the following best operating practices (BMP). a.Minimize over-drying the lumber; b.Maintain consistent moisture content for the processing lumber charge; and c.Dry at the minimum temperature. The permittee shall develop and operate in accordance with a written plan to implement the above BMP and any others required by the kiln manufacturer. Ninety days before the initial startup of the kiln, the permitted shall submit to the Compliance Authority the BMP plan. The Title V air operation permit shall include the submitted BMP plan.
FL-0343	WHITEHOUSE LUMBER MILL	Direct-Fired Continuous Kilns	Wood waste	Volatile Organic Compounds (VOC)	3.76	LB/THOUSAND BOARD FT	0		Proper Maintenance and Operating Procedures: â€¢Minimize over-drying the lumber. â€¢Maintain consistent moisture content for the processing lumber charge. â€¢Dry the lumber at the minimum temperature. â€¢Develop a written Operation and Maintenance (O&M) plan identifying the above practices and the operation and maintenance requirements from the kiln manufacturer. â€¢Record and monitor the total monthly amount and 12-month annual total of wood dried in each kiln (board-feet). â€¢Record the calculated monthly and 12-month annual total emissions of VOC to demonstrate compliance with the process and emissions limits.
FL-0358	GRACEVILLE LUMBER MILL	Direct-fired continuous lumber drying Kiln No. 5	Sawdust	Volatile Organic Compounds (VOC)	3.5	LB/THOUSAND BF	0		Lumber moisture used as proxy for VOC emissions -- product that is over dried likely means more VOC driven off and emitted
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	KILN 3	WASTE WOOD	Volatile Organic Compounds (VOC)	3.83	LB/MBF	0		PROPER MAINTENANCE AND OPERATION
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	KILN 4	WASTE WOOD	Volatile Organic Compounds (VOC)	3.93	LB/MBF	0		PROPER MAINTENANCE AND OPERATION

RBLC RESULTS:

RBLC Search From January 1, 2008 through April 5, 2018 for process, "30.8", specific to wood burning, direct fired kilns.

RBLCID	FACILITY_NAME	PROCESS_NAME	PRIMARY_FUEL	POLLUTANT	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT	CONTROL_METHOD_DESCRIPTION
LA-0252	JOYCE MILL	Lumber kilns		Volatile Organic Compounds (VOC)	930	T/YR	0		properly design and operation
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	EP-3K -Wood-Fired Dry Kiln No. 1	Wood	Volatile Organic Compounds (VOC)	29.27	LB/H	2.96	LB/M BF	Proper kiln design & operation; annual production limit
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	EP-4K â€“ Wood-Fired Dry Kiln No. 2	Wood	Volatile Organic Compounds (VOC)	29.27	LB/H	2.96	LB/M BF	Proper kiln design & operation; annual production limit
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	EP-5K â€“ Wood-Fired Dry Kiln No. 3	Wood	Volatile Organic Compounds (VOC)	29.27	LB/H	2.96	LB/M BF	Proper kiln design & operation; annual production limit
LA-0281	SOUTHWEST LOUISIANA LUMBER OPERATIONS	EP-6K â€“ Wood-Fired Dry Kiln No. 4	Wood	Volatile Organic Compounds (VOC)	29.27	LB/H	2.96	LB/M BF	Proper kiln design & operation; annual production limit
LA-0293	CHOPIN MILL	Lumber Dry Kilns Nos. 1 & 2 (EQT 37 & 38)		Volatile Organic Compounds (VOC)	24.51	LB/H	53.68	T/YR	Good operating practices to limit VOC emissions to 4.29 lb/M bd-ft (12-month rolling average).
LA-0294	DODSON DIVISION	Dry Kiln 1 (033, EQT 15)		Volatile Organic Compounds (VOC)	79.4	LB/H	481.37	T/YR	Good operating practices, including proper design, operation, and maintenance
LA-0294	DODSON DIVISION	Dry Kiln 2 (034, EQT 16)		Volatile Organic Compounds (VOC)	79.4	LB/H	481.37	T/YR	Good operating practices, including proper design, operation, and maintenance
LA-0294	DODSON DIVISION	Dry Kiln 3 (035, EQT 17)		Volatile Organic Compounds (VOC)	90.74	LB/H	481.37	T/YR	Good operating practices, including proper design, operation, and maintenance
LA-0294	DODSON DIVISION	Dry Kiln 4 (051, EQT 32)		Volatile Organic Compounds (VOC)	90.74	LB/H	481.37	T/YR	Good operating practices, including proper design, operation, and maintenance
SC-0135	NEW SOUTH COMPANIES, INC. - CONWAY PLANT	LUMBER KILNS		Volatile Organic Compounds (VOC)	799.18	T/YR	4.2	LB/MBF	PROPER MAINTENANCE AND OPERATION
SC-0136	SIMPSON LUMBER COMPANY, LLC	DIRECT-FIRED LUMBER DRYING KILN NO. 4	DRY WOOD WASTE	Volatile Organic Compounds (VOC)	104	T/YR	3.8	LB/MBF	WORK PRACTICE STANDARDS
SC-0138	ELLIOTT SAWMILLING COMPANY	DIRECT FIRED LUMBER DRYING KILN NO.5	SAWDUST	Volatile Organic Compounds (VOC)	119	T/YR	4.5	LB/MBF	WORK PRACTICE STANDARDS
SC-0149	KLAUSNER HOLDING USA, INC	LUMBER DRYING KILNS EU007		Volatile Organic Compounds (VOC)	3.5	LB/MBF	0		
SC-0151	WEST FRASER - NEWBERRY LUMBER MILL	TWO - 35 MMBTU/H DUAL PATH, DIRECT FIRED, CONTINUOUS LUMBER KILNS, 15 THOUSAND BF/H, EACH	SAWDUST	Volatile Organic Compounds (VOC)	3.76	LB/MBF	376	T/YR	PROPER OPERATION AND GOOD OPERATING PRACTICES
SC-0162	NEW SOUTH LUMBER COMPANY, INC. DARLINGTON PLANT	DKN1	STEAM HEATED	Volatile Organic Compounds (VOC)	343.98	T/YR	0		PROPER OPERATION AND MAINTENANCE
SC-0162	NEW SOUTH LUMBER COMPANY, INC. DARLINGTON PLANT	DKN4	STEAM HEATED	Volatile Organic Compounds (VOC)	343.98	T/YR	0		MAINTENACE AND OPERATING PRACTICES
SC-0162	NEW SOUTH LUMBER COMPANY, INC. DARLINGTON PLANT	DKN5	WOOD WASTE	Volatile Organic Compounds (VOC)	141	T/YR	0		PROPER MAINTENANCE AND OPERATION
SC-0163	KAPSTONE CHARLESTON KRAFT LLC-SUMMERVILLE	LUMBER KILNS		Volatile Organic Compounds (VOC)	225.6	T/YR	3.76	LB/MBF	PROPER MAINTENANCE AND OPERATION
SC-0164	SIMPSON LUMBER COMPANY, LLC	LUMBER KILNS		Volatile Organic Compounds (VOC)	156	T/YR	3.76	LB/MBF	PROPER OPERATION AND MAINTENANCE
SC-0165	NEW SOUTH COMPANIES, INC. - CONWAY PLANT	LUMBER KILNS		Volatile Organic Compounds (VOC)	602	T/YR	4.2	LB/MBF	PROPER MAINTENANCE AND OPERATION
SC-0166	NEW SOUTH LUMBER COMPANY - DARLINGTON INC.	TWO KILNS - KLN5 AND KLN6	GREEN SAWDUST	Volatile Organic Compounds (VOC)	0		0		PROPER OPERATION AND MAINTENANCE
SC-0169	CAMDEN PLANT	DKN6 - DIRECT FIRED CONTINUOUS LUMBER DRYING KILN	WOOD	Volatile Organic Compounds (VOC)	150.4	T/YR	0		
SC-0172	NEW SOUTH COMPANIES, INC. - CONWAY PLANT	LUMBER KILNS		Volatile Organic Compounds (VOC)	602	T/YR	4.2	LB/MBF	PROPER MAINTENANCE AND OPERATION
*SC-0176	GEORGIA PACIFIC - MCCORMICK SAWMILL	Direct fired continuous lumber kiln	Wood Fired	Volatile Organic Compounds (VOC)	0		0		
TX-0584	TEMPLE INLAND PINELAND MANUFACTURING COMPLEX	Dry studmill kilns 1 and 2	wood	Volatile Organic Compounds (VOC)	2.49	LB VOC/1000 BOARDFEE	0		good operating practice and maintenance
TX-0607	LUMBER MILL	Continuous lumber kilns (2)	wood	Volatile Organic Compounds (VOC)	3.5	LB/MBF	0		proper temperature and process management; drying to appropriate moisture content

Appendix F

Emission Factor References

NCDENR "Wood Kiln Emission Calculator" Factor Sheet

FACTORS:

Hardwood VOC factor changed from 0.34 to 0.409 to maintain 10% of softwood factor (REF: Kiln Factors per June 1999 DAQ letter to AFMA - posted on DAQ website)
Hardwood toxics - there are no HAP/TAPS from hardwood kilns reported on this spreadsheet

Softwood: VOC, toxics, and PM from Wallace Pitts (DAQ-RCO) analysis of NCASI/EPA data summarized below (see full spreadsheet on DAQ website for factor documentation):

Note: NCASI data is based on shorter kiln cycles than for lumber kiln cycles at typical wood furniture manufacturing facilities. The emission factors may not be applicable.

Revised, references
Southern Yellow Pine Emission Factors
MBF is 1000 board feet

	emission factor, pounds per MBF		
	Steam heated	Suspension burner	Gasifier
PM	0.022 (1)	0.40 (2)	0.14 (3)
PM_{10}	~	~	~
VOC			
as carbon	3.61 (4)	3.83 (5)	3.83 (5)
as VOC (pinene)	4.09	4.34	4.34
Methanol	0.199 (6)	0.161 (7)	0.161 (7)
Phenol	0.01(8)	0.01 (8)	0.01 (8)
Formaldehyde	0.0183 (9)	0.103 (10)	0.103 (10)
Acetaldehyde (11)	0.052	0.052	0.052
Acrolein (12)	0.0075	0.0075	0.0075

	emission factor, pounds per MBF-hour		
	Steam heated	Suspension burner	Gasifier
Acetaldehyde	0.00377 (13)	0.00377	0.00377
Acrolein	0.00051 (14)	0.00051	0.00051
formaldehyde	0.0014 (15)	0.01185 (16)	0.01185 (16)

For TAPs, the emissions on an hourly basis are given by
(Charge in 1000 board feet)* (emission factor)
Example: 140,000 BF kiln charge = (140)*(0.00140) = 0.196 lb formaldehyde per hour

Note: for hourly emissions of phenol, use emission factor in lb/MBF.

REFERENCES

(1)

PRODUCT	FIRING TYPE	MILLS/UNITS/RUNS	RATIO OF NON-DETECTS	RANGE		MEDIAN	MEAN	UNITS
Southern Pine Lu	Steam Heated	3/3/16	0/16 nd	2.00E-03 to	1.70E-01	9.30E-03	2.20E-02	lb/MBF
Southern Pine Lu	Direct Fired	6/7/24	0/24 nd	2.30E-02 to	1.30E+00	3.20E-01	3.70E-01	lb/MBF

(2) personal Communication, D Word, NCASI, May 31, 2005

Kiln 1K181

Suspension Burner	Run	M 5 lb/MBF	Production	Cycle time, hrs
1K181	1	0.4170	133	20.3
1K181	2	0.3480	133	20.3
1K181	1	0.4800	131	20
1K181	2	0.4100	131	20
1K181	3	0.3600	131	20
		0.40	131.80	20.12

(3) personal Communication, D Word, NCASI, May 31, 2005

Kiln 098 DF

Gasifier	Run	M 5 lb/MBF	Production	Cycle time, hrs
1K098	1	0.2670	130	26.45
1K098	2	0.2010	130	26.45
1K098	3	0.2260	130	26.45
2K098	1	0.1520	128	17.52
2K098	2	0.1810	128	17.52
2K098	3	0.0980	128	17.52
2K098	1	0.0640	104.5	17.25
2K098	2	0.0548	104.5	17.25
2K098	3	0.0466	104.5	17.25
		0.143	120.83	20.41

(4) NCASI Technical Bulletin 845 Table 8.2 Steam heated average of all kilns
(5) NCASI Technical Bulletin 845 Table 8.1 Direct fired (gasifier) full scale kiln only
(6) NCASI Technical Bulletin 845 Table 9.6 Steam heated all kilns
(7) NCASI Technical Bulletin 845 Table 9.4 Direct fired (gasifier) full scale kiln
(8) Table 2A to Appendix B Emission factors for Plywood and Composite Wood Product MACT (Subpart DDDD)
(9) NCASI Technical Bulletin 845 Table 9.5 steam heated full scale kiln and OSU small scale runs. MSU not used. See spreadsheet tab for statistical test
(10) NCASI Technical Bulletin 845 Table 9.3 Direct fired full scale kiln only
(11) NCASI Technical Bulletin 845 Appendix BB6 FSK INDF3 and BB7 OSU INDF3
(12) NCASI Technical Bulletin 845 Appendix BB6 FSK INDF3 and BB7 OSU INDF3
(13) NCASI Technical Bulletin 845 Appendix BB6 FSK INDF3 run # 10 and BB7 OSU INDF3 Run # 2
(14) NCASI Technical Bulletin 845 Appendix BB6 FSK INDF3 run # 10 and BB7 OSU INDF3 Run # 2
(15) NCASI Technical Bulletin 845 Appendix Y7 FSK INDF1 run # 9, BB6 FSK INDF3 run # 10, App Y9 OSU INDF1 run # 4, BB7 OSU INDF3 run # 5
(16) NCASI Technical Bulletin 845 Appendix Y1 FSK DF2 run # 6, Y2 FSK DF5 run # 6

Arkansas Department of Environmental Quality, Memo, "VOC emissions from Lumber Drying Kilns", October 31, 2014

Memorandum

To: ADEQ Air Permit Engineers
From: Thomas Rheaume, Permit Branch Manager
Date: October 31, 2014
RE: VOC emissions from Lumber Drying Kilns

This guidance is to provide some consistency to the evaluation, limits and testing of VOC emissions from lumber kilns. It addresses VOC emissions only and not other emissions such those resulting from fuel use; except that VOC from fuel use is included in the case of direct fired kilns.

Summary

Since:

- The inherent design and function of kilns presents difficulty in testing accurately,
- VOC emissions are not subject to any control by the facility,
- NCASI and ADEQ data shows VOC emissions are consistently in the same emission factor range,
- No benefit is derived by requiring VOC testing on uncontrolled sources if acceptable values are used in permitting analysis, including
    - Emission Rates
    - BACT determinations
    - PSD Determinations/Netting

This memo establishes guidance that any permit that uses an uncontrolled emission factor of 3.5 and 3.8 lbVOC /MBF* average, for indirect and direct fired kilns respectively, is acceptable without additional testing conditions and extends this to PSD issues as listed above. This is a long term average (lb/batch or tons per rolling 12 month) and facilities may request higher short term (lb/hr) rates. Other values can be considered on a case by case basis with or without testing required.

This applies to the emission factor and is not a determination of BACT emission controls. A BACT determination is still required for applicable PSD permits (these factors can be used in the analysis) and if the final permit rates and limits are based on these factors without add on controls, then no testing is necessary.

*MBF is defined as 1000 board-feet of lumber

Discussion

Currently there are 4 types of lumber drying kilns found in Arkansas consisting of combinations of batch and continuous kilns and direct fired (wood or natural gas) and indirect (steam heated). These kilns primarily dry southern yellow pine, though on occasion hardwood may be dried.

Emissions result from the drying of the lumber and also in the combustion of the fuel in the case of direct fired kilns. These kilns do not employ any air pollution control equipment.

The kilns are constructed with multiple stacks or vents. For direct fired kilns, the combustion process contains a blower creating a flow of exhaust gasses. In an indirect kiln, there is no active fan or exhaust.

Stack testing of direct fired kilns has been done in the past by estimating total flow rates based on combustion gasses generated and testing of one vent for emissions, based on the assumption that all vents will have equal concentrations.

Emission data for VOC comes primarily from NCASI data and testing in Arkansas. These are summarized in the table below:

Type of Kiln	NCASI Factor lb/MBF	NCASI VOC Data[1] lb/MBF	ADEQ VOC Factor lb/MBF[5]	AR Test results
Batch Direct	3.8	3.38 lb/MBF mean[2] 5.16 lb/MBF max	3.8 lb/MBF	2.05 lb/hr[6]
Batch Indirect	3.5		3.5 lb/MBF	22.69 lb/hr[6]
Continuous Direct	3.8	3.22 lb/MBF mean 4.59 lb/MBF max	3.8 lb/MBF	3.61 & 2.38 lb/MBF[3] 2.9 lb/MBF[4]
Continuous Indirect	3.5	N/A	3.5 lb/MBF	None

[1]Data from the latest NCASI data collection. NCASI cautions against setting limits based solely on the mean.
[2]Southern Yellow Pine Mix, less than 50% Hardwood – NCASI did not specify if they were DF or IDF, indicated factors are good for both types.
[3] Anthony Forest Products
[4] Bibler Brothers
[5]Value used in permits
[6] Deltic, unknown lb/MBF conversion

BACT determinations for lumber kilns are attached, as of the date of this memorandum.. Many are not listed in lb/MBF but of those listed as such, limits range from 3.5 up to 7 lb/MBF. The most common limits are in the 3.5 to 5.2 range.

LUMBER KILN BACT DETERMINATIONS AS OF 10-31-2014

RBLCID	FACILITY_NAME	FACILITY_STATE	PROCESS_NAME	PRIMARY_FUEL	TESTMETHOD	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT
AL-0235	ALBERTVILLE SAWMILL	AL	TWO 182.14 MBF, STEAM-HEADED LUMBER DRY KILNS (NORTH & SOUTH - K100/K101)		Unspecified	7	LB/MBF	0	
AL-0257	WEST FRASER-OPELIKA LUMBER MILL	AL	Two(2) 87.5 MMBF/YR Continuous kilns with a 35 MMBtu/hr direct-fired wood burner	Wood Shavings	Unspecified	3.76	LB/MBF	175	K/12 MONTHS
AL-0258	WEST FRASER, INC. - MAPLESWILE MILL	AL	Two(2) 100 MMBF/Y Continuous direct fired kiln	Wood Residuals	Unspecified	3.76	LB/MBF	0	
AL-0259	THE WESTERVELT COMPANY	AL	Three (3) 93 MMBF/Y Continous, Dual path, indirect fired kilns	Steam (Indirect heat)	Unspecified	4.57	LB/MMBF	0	
AL-0260	THE WESTERVELT COMPANY	AL	Two (2) 125 MMBtu/Hr. Wood-fired Boilers	Wood Residuals	Unspecified	0.5	LB/MMBTU	0.5	LB/MMBTU
AR-0080	WALDO	AR	STEAM HEATED LUMBER DRYING KILNS		Unspecified	3.5	LB/MBF	0	
AR-0083	POTLATCH CORPORATION - OZAN UNIT	AR	WOOD FIRED BOILER	WOOD CHIPS	Unspecified	0.034	LB/MMBTU	6	LB/H
AR-0083	POTLATCH CORPORATION - OZAN UNIT	AR	KILNS 1-4	STEAM HEATED	Unspecified	3.5	LB/MMBF	119	LB/H
AR-0084	POTLATCH CORPORATION - OZAN UNIT	AR	WOOD FIRED BOILER	WOOD CHIPS	Unspecified	0.034	LB/MMBTU	6	LB/H
AR-0084	POTLATCH CORPORATION - OZAN UNIT	AR	KILNS 1-4	STEAM HEATED	Unspecified	3.5	LB/MMBF	119	LB/H
AR-0101	BIBLER BROTHERS LUMBER COMPANY	AR	SN-07G AND SN-13G CONTINOUS OPERATING KILNS	WOOD RESIDUE	Unspecified	3.8	LB/MBF VOC	46.5	LB VOC/H/KILN
*AR-0102	ANTHONY TIMBERLANDS, INC.	AR	KILN #3 INDIRECT-FIRED	NONE	Unspecified	3.5	LB/MBF	350	T/YR
*AR-0102	ANTHONY TIMBERLANDS, INC.	AR	KILN #4 INDIRECT-FIRED	NONE	Unspecified	3.5	LB/MBF	350	T/YR

RBLCID	FACILITY_NAME	FACILITY_STATE	PROCESS_NAME	PRIMARY_FUEL	TESTMETHOD	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT
*AR-0102	ANTHONY TIMBERLANDS, INC.	AR	KILN #5 INDIRECT-FIRED	NONE	Unspecified	3.5	LB/MBF	350	T/YR
FL-0315	NORTH FLORIDA LUMBER/BRISTOL SAW MILL	FL	Wood lumber kiln	steam heated	Unspecified	116.93	T/YR	0	
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	GA	KILN 3	WASTE WOOD	Unspecified	3.83	LB/MBF	0	
GA-0146	SIMPSON LUMBER CO, LLC MELDRIM OPERATIONS	GA	KILN 4	WASTE WOOD	Unspecified	3.93	LB/MBF	0	
LA-0180	JOYCE MILL	LA	WOOD LUMBER KILNS (INDIRECT FIRED)	N/A	Unspecified	367.77	LB/H	750	T/YR
LA-0181	COUSHATTA SAWMILL	LA	WOOD LUMBER KILNS (INDIRECT FIRED)	N/A	Unspecified	28	LB/H	122.6	T/YR
LA-0252	JOYCE MILL	LA	Kipper Boiler No. 1 and No. 2	wood residue	EPA/OAR Mthd 10	105.52	LB/H	0	
LA-0252	JOYCE MILL	LA	McBurney Boiler No. 4	wood residue	EPA/OAR Mthd 10	279.1	LB/H	0	
LA-0252	JOYCE MILL	LA	Lumber kilns		Unspecified	930	T/YR	0	
OK-0113	WRIGHT CITY COMPLEX	OK	PLANER MILL		Unspecified	0		0	
OK-0113	WRIGHT CITY COMPLEX	OK	LUMBER KILNS		Unspecified	4.8	LB/MBF	0	
OR-0049	GILCHRIST FACILITY	OR	LUMBER DRY KILNS		Unspecified	1.69	LB/MBF	0	
SC-0085	ELLIOT SAWMILLING COMPANY	SC	LUMBER DRYING KILN	WOOD WASTE	Unspecified	4.5	LB/1000 BF	0	
*SC-0135	NEW SOUTH COMPANIES, INC. - CONWAY PLANT	SC	LUMBER KILNS		None selected in SAE	799.18	T/YR	4.2	LB/MBF
SC-0136	SIMPSON LUMBER COMPANY, LLC	SC	DIRECT-FIRED LUMBER DRYING KILN NO. 4	DRY WOOD WASTE	Unspecified	104	T/YR	3.8	LB/MBF

RBLCID	FACILITY_NAME	FACILITY_STATE	PROCESS_NAME	PRIMARY_FUEL	TESTMETHOD	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT
SC-0137	ELLIOTT SAWMILLING COMPANY	SC	DIRECT-FIRED LUMBER-DRYING KILN NO. 4	SAWDUST	Unspecified	122	T/YR	4.5	LB/MBF
SC-0138	ELLIOTT SAWMILLING COMPANY	SC	DIRECT FIRED LUMBER DRYING KILN NO.5	SAWDUST	Unspecified	119	T/YR	4.5	LB/MBF
SC-0149	KLAUSNER HOLDING USA, INC	SC	BIOMASS BOILER EU001	WET BARK, WOOD	Unspecified	0.017	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	BIOMASS BOILER EU002	WET BARK, WOOD	Unspecified	0.017	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	NATURAL GAS BOILER EU003	NATURAL GAS	Unspecified	0.003	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	NATURAL GAS BOILER EU004	NATURAL GAS	Unspecified	0.003	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	NATURAL GAS BOILER EU005	NATURAL GAS	Unspecified	0.003	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	NATURAL GAS BOILER EU006	NATURAL GAS	Unspecified	0.003	LB/MMBTU	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	LUMBER DRYING KILNS EU007		Unspecified	3.5	LB/MBF	0	
SC-0149	KLAUSNER HOLDING USA, INC	SC	COLORS, INKS, LACQUERS EU013		Unspecified	0.03	LB/MBF	0	
*SC-0151	WEST FRASER - NEWBERRY LUMBER MILL	SC	TWO - 35 MMBTU/H DUAL PATH, DIRECT FIRED, CONTINUOUS LUMBER KILNS, 15 THOUSAND BF/H, EACH	SAWDUST	Unspecified	3.76	LB/MBF	376	T/YR
SC-0155	NEW SOUTH LUMBER, INC. - CAMDEN PLANT	SC	WOOD PRODUCTS INDUSTRIES	VIRGIN WOOD WASTE	Unspecified	0		0	
TX-0483	TEMPLE-INLAND DIBOLL OPERATIONS	TX	EAST LUMBER KILNS 1&2 (4)		Unspecified	30.6	LB/H	85.35	T/YR
TX-0483	TEMPLE-INLAND DIBOLL OPERATIONS	TX	WEST LUMBER KILNS 1&2 (4)		Unspecified	30.6	LB/H	85.35	T/YR

RBLCID	FACILITY_NAME	FACILITY_STATE	PROCESS_NAME	PRIMARY_FUEL	TESTMETHOD	EMISSION_LIMIT_1	EMISSION_LIMIT_1_UNIT	EMISSION_LIMIT_2	EMISSION_LIMIT_2_UNIT
TX-0584	TEMPLE INLAND PINELAND MANUFACTURING COMPLEX	TX	Dry studmill kilns 1 and 2	wood	EPA/OAR Mthd 25	2.49	LB VOC/1000 BOARDFEE	0	
WA-0327	SKAGIT COUNTY LUMBER MILL	WA	WOOD-FIRED COGENERATION UNIT	BARK & WASTE WOOD	Unspecified	0.019	LB/MMBTU	35.8	T/YR
WA-0327	SKAGIT COUNTY LUMBER MILL	WA	7. DRY KILNS		Unspecified	54	T/YR	0	
WA-0327	SKAGIT COUNTY LUMBER MILL	WA	ANTI-MOLD SPRAY SYSTEM		Unspecified	9	T/YR	0	

AP-42 Section 1.6 (9/03)

Table 1.6-2. EMISSION FACTORS FOR NO_x, SO_2, AND CO FROM WOOD RESIDUE COMBUSTION[a]

Source Category[c]	NO_x [b]		SO_2 [b]		CO[b]	
	Emission Factor (lb/MMbtu)	EMISSION FACTOR RATING	Emission Factor (lb/MMBtu)	EMISSION FACTOR RATING	Emission Factor (lb/MMbtu)	EMISSION FACTOR RATING
Bark/bark and wet wood/wet wood-fired boiler	0.22[d]	A	0.025[e]	A	0.60[f,g,i,j]	A
Dry wood-fired boilers	0.49[h]	C	0.025[e]	A	0.60[f,g,i,j]	A

[a] Units of lb of pollutant/million Btu (MMBtu) of heat input. To convert from lb/MMBtu to lb/ton, multiply by (HHV * 2000), where HHV is the higher heating value of the fuel, MMBtu/lb. To convert lb/MMBtu to kg/J, multiply by 4.3E-10. NO_x = Nitrogen oxides, SO_2 = Sulfur dioxide, CO = Carbon monoxide.
[b] Factors represent boilers with no controls or with particulate matter controls.
[c] These factors apply to Source Classification Codes (SCC) 1-0X-009-YY, where X = 1 for utilities, 2 for industrial, and 3 for commercial/institutional, and where Y = 01 for bark-fired boiler, 02 for bark and wet wood-fired boiler, 03 for wet wood-fired boiler, and 08 for dry wood-fired boiler.
[d] References 19, 33, 34, 39, 40, 41, 55, 62-64, 67, 70, 72, 78, 79, 88-89.
[e] References 26, 45, 50, 72, 88-89.
[f] References 26, 59, 88-89.
[g] References 19, 26, 39-41, 60-64, 67, 68, 70, 75, 79, 88-89.
[h] References 30, 34, 45, 50, 80, 81, 88-89.
[i] References 26, 30, 45-51, 80-82, 88-89.
[j] Emission factor is for stokers and dutch ovens/fuel cells. References 26, 34, 36, 55, 60, 65, 71, 72, 75. **CO Factor for fluidized bed combustors is 0.17 lb/MMbtu.** References 26, 72, 88-89.

Table 1.6-4. EMISSION FACTORS FOR TRACE ELEMENTS FROM WOOD RESIDUE COMBUSTION[a]

Trace Element	Average Emission Factor (lb/MMBtu)[b]	EMISSION FACTOR RATING
Antimony	**7.9 E-06**[c]	C
Arsenic	**2.2 E-05**[d]	A
Barium	**1.7 E-04**[c]	C
Beryllium	**1.1 E-06**[e]	B
Cadmium	**4.1 E-06**[f]	A
Chromium, total	**2.1 E-05**[g]	A
Chromium, hexavalent	**3.5 E-06**[h]	C
Cobalt	**6.5 E-06**[i]	C
Copper	**4.9 E-05**[g]	A
Iron	**9.9 E-04**[k]	C
Lead	**4.8 E-05**[l]	A
Manganese	**1.6 E-03**[d]	A
Mercury	**3.5 E-06**[m]	A
Molybdenum	**2.1 E-06**[c]	D
Nickel	**3.3 E-05**[n]	A
Phosphorus	**2.7 E-05**[c]	D
Potassium	**3.9 E-02**[c]	D
Selenium	**2.8 E-06**[o]	A
Silver	**1.7 E-03**[p]	D
Sodium	**3.6 E-04**[c]	D
Strontium	**1.0 E-05**[c]	D
Tin	**2.3 E-05**[c]	D
Titanium	**2.0 E-05**[c]	D
Vanadium	**9.8 E-07**[c]	D
Yttrium	**3.0 E-07**[c]	D
Zinc	**4.2 E-04**[o]	A

[a] Units of lb of pollutant/million Btu (MMBtu) of heat input. To convert from lb/MMBtu to lb/ton, multiply by (HHV * 2000), where HHV is the higher heating value of the fuel, MMBtu/lb. To convert lb/MMBtu to kg/J, multiply by 4.3E-10. These factors apply to Source Classification Codes (SCC) 1-0X-009-YY, where X = 1 for utilities, 2 for industrial, and 3 for commercial/institutional, and where Y = 01 for bark-fired boiler, 02 for bark and wet wood-fired boiler, 03 for wet wood-fired boiler, and 08 for dry wood-fired boiler.

[b] Factors are for boilers with no controls or with particulate matter controls.

[c] Reference 26.

[d] References 26, 33, 36, 46, 59, 60, 65, 71-73, 75, 81.

[e] References 26, 35, 36, 46, 59, 60, 65, 71-73, 75.

[f] References 26, 35, 36, 42, 46, 59, 60, 65, 71-73, 75, 81.

[g] References 26, 34, 35, 36, 42, 59, 60, 65, 71-73, 75, 81.

[h] References 26, 36, 46, 59, 60, 71, 72, 73, 75.

[i] References 26, 34, 83.

[j] References 26, 33-36, 46, 59, 60, 65, 71-73, 75, 81.

[k] References 26, 71, 72, 81.

[l] References 26, 33-36, 46, 59, 60, 65, 71-73, 75.

[m] References 26, 35, 36, 46, 59, 60, 65, 71-73, 75, 81.

[n] References 26, 33 - 36, 46, 59, 60, 65, 71-73, 75, 81.

[o] References 26, 33, 35, 46, 59, 60, 65, 71-73, 75, 81.

[p] Reference 34.

EPA/OAR/OAQPS/SPPD/NRG, "Development of a Provisional Emissions Calculations Tool for Inclusion in the PCWP ICR"
June 30, 2017

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
SECTOR POLICIES AND PROGRAMS DIVISION
OFFICE OF AIR QUALITY PLANNING AND STANDARDS
OFFICE OF AIR AND RADIATION

DATE: June 30, 2017

SUBJECT: Development of a Provisional Emissions Calculations Tool for Inclusion in the PCWP ICR

FROM: EPA/OAR/OAQPS/SPPD/NRG

TO: EPA-HQ-OAR-2016-0243

I. Introduction

The U.S. EPA is required under Clean Air Act sections 112(f)(2) and 112(d)(6) to perform a residual risk and technology review (RTR) of the Plywood and Composite Wood Products (PCWP) National Emission Standards for Hazardous Air Pollutants (NESHAP) codified in 40 CFR part 63, subpart DDDD. In order to conduct the data analyses required for the RTR, the EPA is developing an Information Collection Request (ICR) to gather information from the PCWP industry. As part of the ICR, facilities would be asked to compile a HAP emissions inventory that would be used in the EPA's residual risk modeling. The EPA will review the file for quality assurance (QA) and standardization. The EPA has included a Provisional Calculation Tool within the draft PCWP ICR spreadsheet in order to address stakeholder concerns regarding the level of effort (burden) required to develop the HAP emissions inventory as part of the ICR response. Some stakeholders have indicated that many facilities do not maintain HAP emissions inventories, and therefore, considerable effort will be required to develop the inventory required for the ICR. The goal of the developing the provisional calculations is to reduce respondent burden.

Instructions for use of the Provisional Calculation Tool are provided in the ICR instruction document accompanying the draft ICR spreadsheet (PCWP_survey.xlsx). The provisional calculations are built into the *HAP Emissions* tab of the draft ICR spreadsheet. Because use of the provisional calculations is optional, the columns and instructions pertaining to the Provisional Calculation Tool can be ignored by facilities not using the tool.

The purpose of this memorandum is to document the emission factors used in the Provisional Calculation Tool to facilitate public comment on the utility of the tool. Section II provides an overview of the PCWP Source Classification Codes (SCCs) and discusses the selection of emission factors for organic and metal HAP. Appendices to this memorandum list the SCCs and pollutants with emission factors included in the Provisional Calculation Tool.

II. Selection of Emission Factors

A. Source Classification Codes and Process Unit Types

The U.S. EPA uses SCCs to classify different types of activities that generate emissions. Each SCC represents a unique source category-specific process or function that emits air pollutants. The SCCs are used as a primary identifying data element in EPA’s emission factor references (such as AP-42), the National Emissions Inventory (NEI), and other EPA databases. The SCCs are also used by many regional, state, local and tribal agency emissions data systems.

The list of SCCs applicable to the PCWP industry was updated in 2015, expanding the list to describe the relevant PCWP processes and to assign each process an SCC. A few additional revisions were made in 2016. The additional SCCs were added to assist various stakeholders in creation of emissions inventories for PCWP facilities. At present, there are 422 SCCs applicable to the PCWP industry. Many of the new SCCs do not yet appear in the most recent version (2014) version of the NEI.

In general, SCCs use a hierarchical system in which the classification of the emissions process becomes increasingly more specific with each of the four levels. The first level of description provides the most general information about the emissions process. The fourth level is the most detailed and describes specifics about emissions process. Over time the evolution of emissions activity and regulations where SCCs were needed, as well as other factors, have led to a concurrent evolution of the SCCs structure. Some SCCs have been retired, others have been created, and others have been modified or converted. Some SCCs may be extremely detailed in their representation of a process while others may not be as detailed. SCCs are not specific to a pollutant. Consequently, an SCC can describe a process that emits more than one pollutant.[1] Table 1 provides the SCC levels for the PCWP manufacturing industry.

[1] Introduction to Source Classification Codes and their Use for EIS Submissions, https://ofmpub.epa.gov/sccsearch/docs/SCC-IntroToSCCs.pdf

Table 1. SCC Levels for the PCWP Manufacturing Process Units

SCC Level	Description
Level 1	Industrial Processes
Level 2	Pulp and Paper and Wood Products
Level 3	• Plywood Operations • Particleboard Manufacture • Medium Density Fiberboard (MDF) Manufacture • Oriented Strandboard (OSB) Manufacture • Hardboard (HB) Manufacture • Fiberboard (FB) Manufacture • Glulam Manufacture • I-Joist Manufacture • Laminated Veneer Lumber (LVL) Manufacture • Laminated Strand Lumber (LSL) Manufacture • Parallel Strand Lumber (PSL) Manufacture • Sawmill Operations
Level 4	*Example:* Hardwood Veneer Dryer: Direct Natural Gas-fired: Cooling Section

Most of the PCWP SCCs are clearly or potentially applicable to PCWP process units covered under the ICR. Sixty (60) SCCs that are not applicable to the PCWP NESHAP source category were removed from the SCC list for the ICR, including:

- SCCs for "green-end" wood material handling sources not expected to emit HAP, but have SCCs because they are PM sources; and
- SCCs for lumber processing sources other than lumber kilns which are outside of the PCWP source category.

Appendix A lists the specific SCCs that were removed from the PCWP ICR.

Each facility responding to the ICR would select the applicable SCCs for their PCWP manufacturing operations. Stationary combustion sources (such as boilers) are not required to be included in the PCWP ICR unless the combustion unit provides direct heat to a dryer such that the combustion unit and dryer exhaust are comingled. To facilitate selection of appropriate SCCs for the PCWP ICR, the PCWP product types (coinciding with SCC Level 3) and the process unit types required to be included in the PCWP ICR were mapped to the SCCs. Occasionally, multiple SCCs apply for the same process unit (e.g., there are different SCCs for veneer dryer heated zones and cooling sections). An "other" process unit type was associated with SCCs that are generic in nature or are not necessarily related to process units that emit HAP. **Appendix B** provides this mapping of SCCs with products and PCWP process units. A total of 362 SCCs are included for selection in the PCWP ICR.

B. Organic HAP Emission Factors

1. Use of AP-42

The number of PCWP SCCs now available greatly exceeds the number of SCCs appearing in AP-42, Chapter 10 (which covers the wood products industry). AP-42 Chapter 10 includes six sections with emission factors for the PCWP industry as shown in Table 2. The SCCs represented in AP-42 Chapter 10 were limited to the number of SCCs with available emission factors for criteria or hazardous air pollutants at that time. The PCWP AP-42 emission factors were last updated following collection of data for the PCWP NESHAP in 2002 and remain the largest single source of emission factors readily available to stakeholders and the public.[2]

Table 2. PCWP AP-42 Chapters

Section	Title	Date
10.5	Plywood Manufacturing	January 2002
10.6.2	Particleboard	June 2002
10.6.3	Medium Density Fiberboard	August 2002
10.6.4	Hardboard and Fiberboard	October 2002
10.9	Engineered Wood Products	November 2002

The AP-42 chapters are available at: https://www3.epa.gov/ttn/chief/ap42/ch10/index.html

It is acknowledged that the AP-42 emission factors are now somewhat dated in relation to developments in the PCWP industry. The AP-42 emission factors predate the 2007 PCWP NESHAP compliance date when many facilities installed controls on PCWP process units. However, the available uncontrolled AP-42 emission factors could be coupled with control efficiency estimates to estimate controlled emissions for facilities that do not have site-specific measurements or more representative data for certain HAP. The AP-42 emission factors also predate implementation of resin changes to reduce formaldehyde off-gassing from interior PCWP products. It is expected that use of the AP-42 factors would err on the side of overestimating emissions at facilities switching to low- or no-added formaldehyde resins.

In summary, AP-42 was selected as the reference for the organic HAP emission factors used in the Provisional Calculation Tool because:

- There is no other more-comprehensive, publicly-available information source,
- AP-42 is an EPA document that underwent a stakeholder review process prior to finalization, and
- The tradeoffs for using information dating back to 2002 in the tool seem to be a reasonable compromise for reducing the burden for facilities with no current HAP inventory and no other source of information to use for estimating emissions.

In order to use the AP-42 emission factors in the Provisional Calculation Tool, available "sets" of organic HAP emission factors representing uncontrolled emissions were paired with each SCC. As noted above, the number of SCCs exceeds the number of AP-42 emission factors. Therefore, it was necessary to extrapolate related emission factor sets to SCCs not having directly matched factors. A "set" of emission factors includes all the HAP for that SCC for which

[2] It is acknowledged that updated emission factors are maintained by and available to members of the National Council for Air and Stream Improvement (NCASI) and that member facilities will likely choose to use the NCASI emission factors in preparing their ICR emission inventories. The ICR instructs respondents to use the most-representative means of estimating emissions available to them, including site-specific emissions measurements or, if measurements are not available, emission estimates based on representative emission factors.

emission factors were not labeled below detection limit (BDL). The BDL labeling in AP-42 indicates that all of the measurement data use to derive the emission factor for a given pollutant was below the test method detection limit. The AP-42 indicates "BDL" instead of presenting a number in these cases. Emissions estimates based on BDL data are not necessary for the risk modeling inventory the provisional calculations are designed to inform.

After comparing the pollutants with positive (non-BDL) emission factors in all of the "sets" available, a menu list of HAP compounds for inclusion in the ICR was developed that includes all the HAP for which provisional calculation formulas are available. If applicable, respondents would specify additional HAP compounds beyond those included in the list and provide their own site-specific estimate of HAP emissions. **Appendix C** lists the HAP compounds with provisional calculation formulas. Only a small number of these HAP compounds apply for most process units. For example, methanol and formaldehyde are the most commonly-emitted HAP compounds for PCWP process units, followed by acetaldehyde, acroelin, phenol and propionaldehyde. There is no data to show (and little reason to expect) that most of the other HAP compounds in the list are emitted in detectable amounts. The HAP compounds with positive (non-BDL) emission factors are listed in **Appendix B** for each SCC matched to an emission factor. Process unit types that heat wood (i.e., dryers and presses) have more associated HAP compounds than other wood processing units (e.g., saws, formers, chippers).

For many SCCs there was no HAP emission factor set available, either because no HAP data were available for emission factor development or because all of the available HAP factors were BDL. Many of the PCWP SCCs represent process units that are not known to emit HAP, so it follows that there would be no HAP emission factors for several of the SCCs. These SCCs are labeled with "No EF for SCC" in the EF source column of **Appendix B**. The "No EF for SCC" notation will display in the provisional calculation columns of the *HAP Emissions* tab in the PCWP ICR. Similarly, there are no HAP emission factors for many pollutants, either because no HAP data were available for emission factor development or because all of the available HAP factors were BDL. HAP compounds without emission factors are labeled "No EF for pollutant" in the provisional calculation columns of the *HAP Emissions* tab in the PCWP ICR. Respondents having additional information suggesting there are HAP emissions for a given process unit with an SCC labeled "No EF for SCC" or "No EF for pollutant" would be expected to enter their own site-specific estimates of HAP emissions. Alternatively, if there is no reason to expect HAP compound emissions from the process unit with a SCC labeled "No EF for SCC" or "No EF for pollutant" then the respondent may choose not to enter any HAP emissions estimate for the process unit or HAP compound based on their engineering judgement.

2. Matching the SCCs with Emission Factors

The AP-42 background documentation spreadsheets available at (https://www3.epa.gov/ttn/chief/ap42/ch10/index.html) were used as the first step in mapping relevant emission factors to the revised SCCs. Each emission factor set was matched based on the numeric SCC when possible, resulting in approximately 50 direct matches. This step is reflected in the "Emission Factor Grouping (AP-42) exact SCC match" column in **Appendix B**. In this column, N/A means additional effort was needed to identify an emission factor matching the SCC, either because the numeric SCC had changed with the recent SCC revisions or because no exactly-matching AP-42 emission factor was available.

Next, the SCC descriptions were reviewed in conjunction with the emission factor descriptions in the AP-42 background documentation spreadsheets and in the AP-42 chapters. Additional directly relevant matches were identified for SCCs and emission factors.

Finally, the remaining SCCs for which no directly matching emissions factors were identified were reviewed to determine if a closely-related or slightly more-conservative emission factor might apply in the absence of any other more-representative, site-specific information. In this step, attempts were made to select the most representative emission factors available, erring on the conservative side to avoid the underestimation of emissions. Where a comparable factor was not available, a conservative approach was taken and the next higher emission factor was used. For example, if no direct-natural gas fired dryer emission factor was in AP-42, but there was a direct wood-fired emission factor for the dryer, the wood fired emission factor was applied. The following conservative substitution assumptions were used:

- Substitution of a softwood emission factors for units processing mixed or hardwood species.
- Substitution of a mixed-species emissions factors for units processing hardwoods.
- Substitution of a direct-wood fired emission factors for direct-gas fired process units.
- Substitution of a direct-wood or direct-gas fired emission factors for indirect-fired process units.
- Substitution of emission factors for formaldehyde-containing resin for process units using non-UF or non-PF resin.
- Substitution of emission factors for blowline blend for non-blowline blend.
- Substitution of emission factors for batch press for continuous presses
- Substitution of emission factors for dry hardboard press for wet hardboard press.
- Substitution of emission factors for related products (e.g., OSB vs LSL; LVL vs PSL, SPW for LVL). When crossing product types, the presence of formaldehyde in the adhesive and dryer firing method was considered. It was presumed that:
    - Formaldehyde emissions were greater according to the hierarchy of: UF > PF > No HCHO (ex. MDI), and
    - Dryer emissions were greater according to the hierarchy of: direct wood fired > direct natural gas fired > indirect heat.

It is acknowledged that variability in emissions can mask the effects of any of the above variables. Also, given the combination of multiple process characteristics reflected in some of the available emission factors, in many cases there is no clear way to distinguish which emission factors may be the most conservative (e.g., for hardboard dryers there are multiple competing process characteristics including blend method, softwood/hardwood, firing method, and resin type).

The “Related AP-42 EF to use in absence of more-representative data” column in **Appendix B** of this document includes a description of the most-closely related emission factor included in the provisional calculations. This column is provided in the provisional calculation columns of the *HAP Emissions* tab in the PCWP ICR in order for respondents to judge whether the provisional calculations are based on an emission factor sufficiency representative of their process unit in the absence of more-representative, site-specific information. Respondents are given the option to insert and substitute a more-representative emission factor into the provisional calculations if they have a better emission factor available to them.

Some of the related emission factors require conversions for the production units of measure (e.g., to convert from one panel thickness basis to another). A “scalar” column is included in the *HAP emissions* tab for this purpose. **Appendix D** provides a table showing the scalar factors included in the provisional calculations.

The PCWP ICR instructions document provides a lengthy description of how the provisional calculations work and presents the formulas used to calculate emissions. The calculations include the provisional emission factor, unit of measure scalar, process unit production rate, control efficiency (if applicable), a release point apportionment fraction (for process units with multiple release points), and a conversion from pounds to tons. **Appendix E** contains a table showing the numeric emission factors included in the provisional calculations.

3. Lumber kiln emission factors

No AP-42 emission factors are available for lumber kilns. Therefore, a comparison of lumber kiln emission factors from various references was conducted. Emission factors from NCASI were found to align with the various references and were included in the provisional calculations for the lumber kiln SCCs.

C. HAP Metal Emission Factors

Direct-fired dryers may have burners integral to the dryers (e.g., rotary dryers) or stand-alone combustion units that exhaust through the dryers. It is anticipated that there could be HAP metals emissions associated with combustion of fuels in direct-fired PCWP dryers. Fuel types used in the PCWP industry include:

- Resin free wood, sawdust or bark
- Trim/sawdust containing resin
- Natural gas
- Propane
- Residual/distillate oil
- Other materials used uncommonly such as waste water residuals, used oil, blender cleanings, spray booth solids

Of the fuels listed above, biomass fuels and natural gas are by far the most common. Coal is not used as a PCWP direct-fired dryer fuel. Of the PCWP fuels used, only biomass and fuel oil are expected to have measurable amounts of HAP metals emissions. Use of fuel oil in the PCWP industry is limited.

The EPA is not aware of any HAP metals emissions test data for PCWP direct-fired dryers. However, fuel analysis data for biomass combustion in boilers is available and, in the absence of better information, is reasonably transferable to combustion of these fuels in PCWP dryers for purposes of developing emission estimates for the EPA's residual risk analysis. However, boiler data would not be useful for setting metals emissions limits for dryers. Actual metals emissions data from dryers would be needed for this purpose or a PM-surrogate could be considered.

Fuel analysis data from the May 2012 Boiler MACT emission data base was queried based on NAICS 321 for the combustion unit types most relevant to direct-fired dryer combustion units burning forest biomass (stoker/sloped grate and suspension burner). The average standardized concentration in milligrams per gram of fuel (mg/g) and the standardized fuel-based emission factor in pounds per million Btu (lb/MMBtu) are summarized in Table 3 along with the non-detect rate. As a conservative measure (more likely to overestimate emissions), detection limit values available for non-detect samples were included in the averages presented in Table 3. The uncontrolled lb/MMBtu values in Table 3 can be coupled with facility-specific PM control efficiency (if known) to estimate HAP metals emissions from PCWP direct-fired dryers. Assuming a PM collection efficiency of 99 percent, the emission rates in Table 3 were found to compare reasonably with emission factors presented in NCASI Technical Bulletin 1013[3] for HAP metals from biomass boilers of various designs and control devices. The emission factors derived from the boiler MACT data also compare favorably to those in AP-42 Chapter 1.6, though it is noted that the AP-42 factors represent a mixture of controlled and uncontrolled data.

The biomass emission factors in Table 3 were included in the provisional calculations to estimate direct wood-fired emissions for the following types of dryers: dry rotary dryers, green rotary dryers, primary tube dryers, softwood veneer dryers, and rotary strand dryers. If other types of dryers are direct-wood fired, facilities may use the emission factors in Table 3 to estimate emissions on a facility-specific basis.

For oil-fired PCWP dryers, uncontrolled emission factors from the AP-42 section 1.3[4] for residual fuel oil combustion in boilers can be coupled with facility-specific PM control efficiency (if known) to estimate HAP metals emissions. These emission factors were converted to lb/MMBtu using an average heating value of 0.145 MMBtu per gallon as shown in Table 4. Facilities may use these emission factors for direct oil-fired dryers. The oil-fired emissions factors were not programed into the provisional calculations because there are no PCWP SCC codes specific to oil firing.

In the absence of site-specific control efficiency information, suggested default control efficiencies for purposes of PCWP direct-fired process unit metal HAP estimates are as follows:

- Wet or dry electrostatic precipitator or baghouse – 99%
- Mechanical collector cyclone or multiclone – 90%
- Wet scrubber - 95%

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[3] National Council for Air and Stream Improvement. *A Comprehensive Compilation and Review of Wood-Fired Boiler Emissions.* Technical Bulletin 1013, March 2013.

[4]AP 42, Fifth Edition, Volume I. Section 1.3: Fuel Oil Combustion, Supplement E September 1999, corrected May 2010. https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s03.pdf

These values are based on review of control technology fact sheets.[5]

The toxicity of chromium and mercury is largely dependent on the oxidation state of these compounds, and is an important factor in evaluating the health effects from exposure to chromium and mercury compounds. Chromium (Cr) exists in several different oxidation states, but the most stable and most commonly found are hexavalent chromium (Cr^{+6} valence state) (or Cr VI) and trivalent chromium (Cr^{+3} valence state) (or Cr III). The most common mercury species are divalent mercury (Hg^{+2}) (including both particulate and gaseous forms) and elemental gaseous mercury (Hg^0). In the absence of data on the specific oxidation state of chromium or mercury, emissions data reported can be speciated using the NEI default multipliers of 0.2 for particulate divalent mercury, 0.3 for gaseous divalent mercury, and 0.5 for elemental gaseous mercury. Only particulate divalent mercury would be coupled with a PM control device efficiency for purposes of estimating emissions. The default multipliers for PCWP SCC codes of 0.28 for hexavalent chromium (Cr IV) and 0.72 for trivalent chromium (Cr III) may be used. Emission factors adjusted with these multipliers are presented in Tables 3 and 4.

Table 3. Summary of HAP Metals Provided in the 2012 Boiler Fuel Analysis Data Set for Stoker/Sloped Grate Boilers and Suspension Burners for NAICS 321: Wood Products Manufacturing

HAP metal	Concentration mg/g	Concentration mg/kg	ND rate	lb/MMBtu (uncontrolled)	lb/MMBtu (99% control)
Antimony (Sb)	0.000364	0.36	73%	4.21E-05	4.21E-07
Arsenic (As)	0.001053	1.1	47%	1.11E-04	1.11E-06
Beryllium (Be)	0.000225	0.22	54%	2.10E-05	2.10E-07
Cadmium (Cd)	0.000233	0.23	20%	2.44E-05	2.44E-07
Chromium (Cr)	0.001231	1.2	13%	1.66E-04	1.66E-06
Cr IV				4.66E-05[1]	
Cr III				1.20E-04[1]	
Cobalt (Co)	0.000235	0.23	32%	2.69E-05	2.69E-07
Lead (Pb)	0.000761	0.76	31%	8.29E-05	8.29E-07
Manganese (Mn)	0.347037	347	0.3%	3.97E-02	3.97E-04
Mercury (Hg)	0.001441	1.4	17%	1.66E-04	1.66E-06
Particulate Hg^{+2}				3.32E-05[1]	
Gaseous Hg^{+2}				4.98E-05[1]	
Elemental gaseous Hg				8.31E-05[1]	
Nickel (Ni)	0.003777	3.8	16%	4.51E-04	4.51E-06
Selenium (Se)	0.017402	17	52%	2.01E-03	2.01E-05

1. Speciated based on the chromium and mercury emission factors using default multipliers as described above.

[5] Air Pollution Control Technology Fact Sheets available at https://www.epa.gov/catc/clean-air-technology-center-products#factsheets

Table 4. Summary of HAP Metals Provided in AP-42 Section 1.3 for Residual Oil Fired Boilers

HAP metal	lb/1000 gal (uncontrolled)	lb/MMBtu[1] (uncontrolled)
Antimony (Sb)	5.25E-03	3.62E-05
Arsenic (As)	1.32E-03	9.10E-06
Beryllium (Be)	2.75E-05	1.90E-07
Cadmium (Cd)	3.98E-04	2.74E-06
Chromium (Cr)	8.45E-04	5.83E-06
Cr IV	2.48E-04	1.71E-06
Cr III		4.12E-06[2]
Cobalt (Co)	6.02E-03	4.15E-05
Lead (Pb)	1.51E-03	1.04E-05
Manganese (Mn)	3.00E-03	2.07E-05
Mercury (Hg)	1.13E-04	7.79E-07
Particulate Hg^{+2}		1.56E-07[3]
Gaseous Hg^{+2}		1.17E-04[3]
Elemental gaseous Hg		9.42E-07[3]
Nickel (Ni)	8.45E-02	5.83E-04
Selenium (Se)	6.83E-04	4.71E-06

1. Converted to lb/MMBtu using a heating value of 0.145 MMBtu per gallon.
2. Calculated as the difference between the AP-42 emission factors for Cr and Cr VI.
3. Speciated based on the chromium and mercury emission factors using default multipliers as described above.

The PCWP ICR Instructions document describes the formulas used in the provisional calculations for metals. Because only biomass firing is included in the calculations, the dryer heat input (MMBtu/hr) associated with biomass is determined from elsewhere in the spreadsheet. Respondents are asked to provide a value for PM control efficiency. The heat input is multiplied by the emission factor (lb/MMBtu), control efficiency, and the process unit operating hours reported in the ICR. A release point apportionment fraction (for process units with multiple release points) is applied and emissions are converted to tons per year.

III. Summary

This memorandum explains the methods used to assign and apply available emission factors in a Provisional Calculation Tool under consideration for inclusion in the forthcoming PCWP ICR. The tool is comprised of calculations within the *HAP Emissions* tab of the ICR. Use of the provisional calculations would be optional. The tool is intended to aid facilities that either do not maintain HAP emissions inventories or do not have site-specific or more-representative data.

The EPA would appreciate additional stakeholder comment on the utility of the provisional calculations. The EPA is interested in whether the provisional calculations achieve the goal of reducing the ICR response burden. The EPA chose to use AP-42 emission factors because they are publicly-available. The EPA is interested in comments regarding whether it would be more appropriate for facilities to develop their own emission estimates based on data or emission factors available to them as opposed to using AP-42 emission factors matched to related SCCs as described in this memorandum.

PCWP	SCC	SCC Level Four	ICR Process Unit Type	Related AP-42 EF to use in absense of more represetnative data	EF source	EF units	Acetaldehyde	Acrolein	Formaldehyde	Methanol	Phenol	Propionaldehyde
plywood	30700791	Hammermill/Chipper: Dry Wood Material	Panel trim chipper	SPW dry trim chipper (chips dry trim from SPW panel saws; process rate = finished board production)	AP-42, Ch 10.5	lb/MSF 3/8				0.0078		
plywood	30700794	Miscellaneous Coating Operations	Miscellaneous coating operation		No EF for SCC							
plywood	30700799	Other Not Classified	Other		No EF for SCC							
lumber	30700830	Lumber Kiln: Softwood: Pine Species	Lumber kiln		NCASI Emission Factors 2014 (Direct Fired)	lb/MBF	0.04	0.004	0.065	0.18	0.01	0.004
lumber	30700831	Lumber Kiln: Softwood: Lumber Kiln: Non-Pine Western Softwoods	Lumber kiln		NCASI Emission Factors 2014 (Direct Fired)	lb/MBF	0.04	0.004	0.065	0.18	0.01	0.004
lumber	30700833	Lumber Kiln: Hardwood	Lumber kiln		NCASI Emission Factors 2014 (Direct Fired)	lb/MBF	0.04	0.004	0.065	0.18	0.01	0.004
MDF	30700909	Pressurized Refiner/Primary Tube Dryer: Direct Natural Gas-fired: Blowline Blend: Non-Urea Formaldehyde Resin:	Primary tube dryer	MDF, tube, direct wood-fired, blowline blend, UF, softwood	AP-42, Ch 10.6.3	lb/ODT			0.86			
MDF	30700910	Pressurized Refiner/Primary Tube Dryer: Direct Natural Gas-fired: Blowline Blend: Non-Urea Formaldehyde Resin:	Primary tube dryer	MDF, tube, direct wood-fired, blowline blend, UF, softwood	AP-42, Ch 10.6.3	lb/ODT			0.86			
MDF	30700911	Pressurized Refiner/Primary Tube Dryer: Direct Natural Gas-fired: Blowline Blend: Non-Urea Formaldehyde Resin: Mixed	Primary tube dryer	MDF, tube, direct wood-fired, blowline blend, UF, softwood	AP-42, Ch 10.6.3	lb/ODT			0.86			
MDF	30700912	Pressurized Refiner/Primary Tube Dryer: Direct Natural Gas-fired: Blowline Blend: Urea Formaldehyde Resin:	Primary tube dryer	MDF, tube, direct wood-fired, blowline blend, UF, softwood	AP-42, Ch 10.6.3	lb/ODT			0.86			
MDF	30700913	Pressurized Refiner/Primary Tube Dryer: Direct Natural Gas-fired: Blowline Blend: Urea Formaldehyde Resin:	Primary tube dryer	MDF, tube, direct wood-fired, blowline blend, UF, softwood	AP-42, Ch 10.6.3	lb/ODT			0.86			